ALAMEDA COUNTY
CONGESTION MANAGEMENT AGENCY

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E-MAIL: mail@accma.ca.gov • WEB SITE: accma.ca.gov

I-680 SMART CARPOOL LANE
POLICY ADVISORY COMMITTEE

(Note Change in Time and Location)

Thursday, September 1, 2005
2:00 PM
Ardenwood Room
City of Fremont
3300 Capitol Avenue, Building A
Fremont, CA 94537

Members
Mayor Bob Wasserman, Chair , ACTIA
Supervisor Scott Haggerty, Vice Chair, ACTIA
Mayor Janet Lockhart, ACCMA
Mayor Jennifer Hosterman, ACCMA
Councilmember Bob Livengood, VTA

Agenda

"Copies of individual Agenda Items are available on the CMA's Website"

1. Introductions

2. Public Comment

Members of the public may address the Committee during "Public Comment" on any item not on the agenda. Public comment on an agenda item will be heard when that item is before the Committee. Anyone wishing to comment should make their desire known to the Chair.

3. Minutes of August 4, 2005* — Action

The Committee is requested to approve the Minutes of August 4, 2005 as attached.

4. Draft Concept of Operations Report* — Action

The attached Draft Concept of Operations Report provides a preliminary overview of the design and operation of the Smart Carpool Lane. Review and comment from the partnering agencies (Caltrans, Bay Area Toll Authority, and the California Highway Patrol) is needed in areas of enforcement, agency responsibilities, maintenance of the pavement, the electronic toll collection system and other details in order to finalize the Concept of Operations. The consultant will highlight specific areas that may be of particular concern. The Committee is requested to review and approve the key recommendations contained within the draft and approve the draft for distribution to our partner agencies.

5. Public Outreach — Information

A consultant selection committee consisting of representatives from MTC, ACTIA, Federal Highway Administration, Caltrans and the CMA reviewed five proposals for Phase 1 (public meeting and a report of the findings and next steps) of the public outreach efforts. The Phase 2 work will begin later this fall.

6. I-680 Corridor Improvements* Information

The Committee requested a progress report on other corridor improvements. Caltrans will provide a status report on the next phase of the southbound I-680 HOV lane. CMA staff will provide a status report on the soundwall project currently under construction.

7. Minneapolis Field Trip Action

At the conclusion of the meeting on August 4th, all of the Policy Advisory Members indicated an interest in traveling to Minneapolis to view the MnPass facility. The last week in October was suggested. The CMA Board is scheduled to meet on Thursday, October 27th; therefore, it appears that the schedule would include leaving Oakland/SF on Monday, October 24th and returning on Wednesday, October 26th. Is this timeframe acceptable? The CMA will make the arrangements for the PAC members.

8. Adjourn; Next Meeting: Thursday, October 6, 2005

*** Materials enclosed**

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I-680 Smart Carpool Lane
Policy Advisory Committee

Minutes of Thursday, August 4, 2005

1. Introductions

2. Election of Chair and Vice Chair

By unanimous vote Bob Wasserman was elected Chair and Scott Haggerty was elected Vice-Chair

3. Responsibilities of the Policy Advisory Committee* — Information

Hart highlighted the responsibilities of the Committee as described in the Guiding Framework for the Joint Powers Agreement. The Policy Advisory Committee will transition to the Joint Powers Board after the JPA was been adopted by ACTIA, VTA and ACCMA.

4. Overview of the I-680 Smart Carpool Lane (including schedule)* — Information

Scott provided an overview of the proposed project including design, operations, and schedule.

5. Joint Powers Agreement: Status Report* — Information

Hart provided a status report on the JPA. The JPA is expected to be adopted by the partner agencies fall 2005.

6. Public Outreach: Scope of Work for Phase 1* — Action

Hart presented the scope of work for the first phase of the public outreach program. Haggerty moved and Hosterman seconded to approve the scope of work. The motion passed unanimously.

7. Regular Meeting Date/Location — Action

The Committee will meet 2:00 PM on the first Thursday of the month at the City of Fremont offices.

8. Adjourn

The meeting adjourned at 3:45 PM

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I-680 SMART CARPOOL LANE POLICY ADVISORY COMMITTEE
AUGUST 4, 2005
ROSTER OF MEETING ATTENDANCE
NILES ROOM, CITY OF FREMONT,
39550 LIBERTY STREET, FREMONT, CALIFORNIA

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20.				
21.				
22.				

I-680 Smart Carpool Lane Concept of Operation Overview

1. Role of the Concept of Operations
2. Concept of Operations Summary
   - Reasons to implement
   - Configuration
   - User benefits
   - Technology
   - Agency Roles
   - Regional Customer Service Center
3. Recommendations for approval

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Concept of Operations for the I-680 Smart Lane

- The Concept of Operations document is a high-level description of how the Smart Lane will operate
- This document will be incorporated into the Electronic Toll System Request For Proposals

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Reasons to Implement the I-680 Smart Carpool Lane

- Improve traffic flow and travel time in the corridor
- Address the expected growth in traffic congestion
- Provide Single Occupant Vehicles (SOVs) with choice to save time for a fee (toll)
- Optimize revenue to help pay for transportation improvements in the corridor

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Configuration of the I-680 Smart Lane

- Traffic and revenue analysis identified Intermediate Ingress and Egress Locations to optimize use of this Section of I-680
- Ingress and Egress Configurations can be accommodated within the current Right-of-Way, pending State and Federal approval
- All tolling will be electronic; no toll booths will be needed

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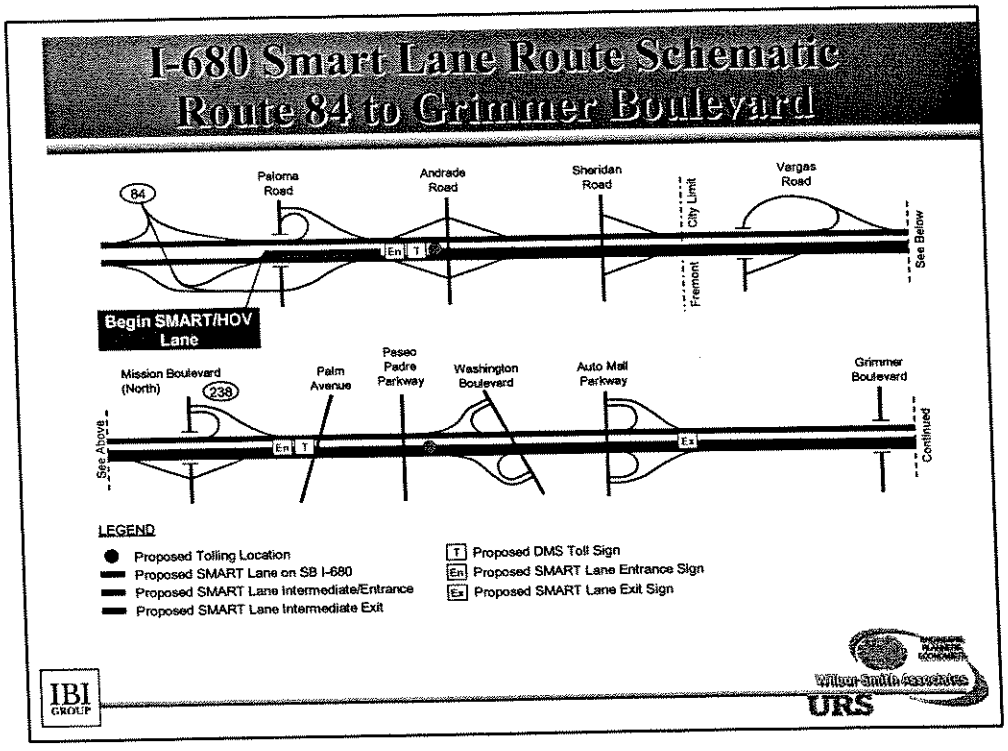
I-680 Smart Lane Route Schematic
Route 84 to Grimmer Boulevard
84
Paloma Road
Andrade Road
Sheridan Road
City Limit
Fremont
Vargas Road
See Below
En
T
Begin SMART/HOV Lane
Mission Boulevard (North)
238
Palm Avenue
Peseo Padre Parkway
Washington Boulevard
Auto Mall Parkway
Grimmer Boulevard
See Above
Continued
Ex
LEGEND
Proposed Tolling Location
Proposed SMART Lane on SB I-680
Proposed SMART Lane Intermediate/Entrance
Proposed SMART Lane Intermediate Exit
T Proposed DMS Toll Sign
En Proposed SMART Lane Entrance Sign
Ex Proposed SMART Lane Exit Sign
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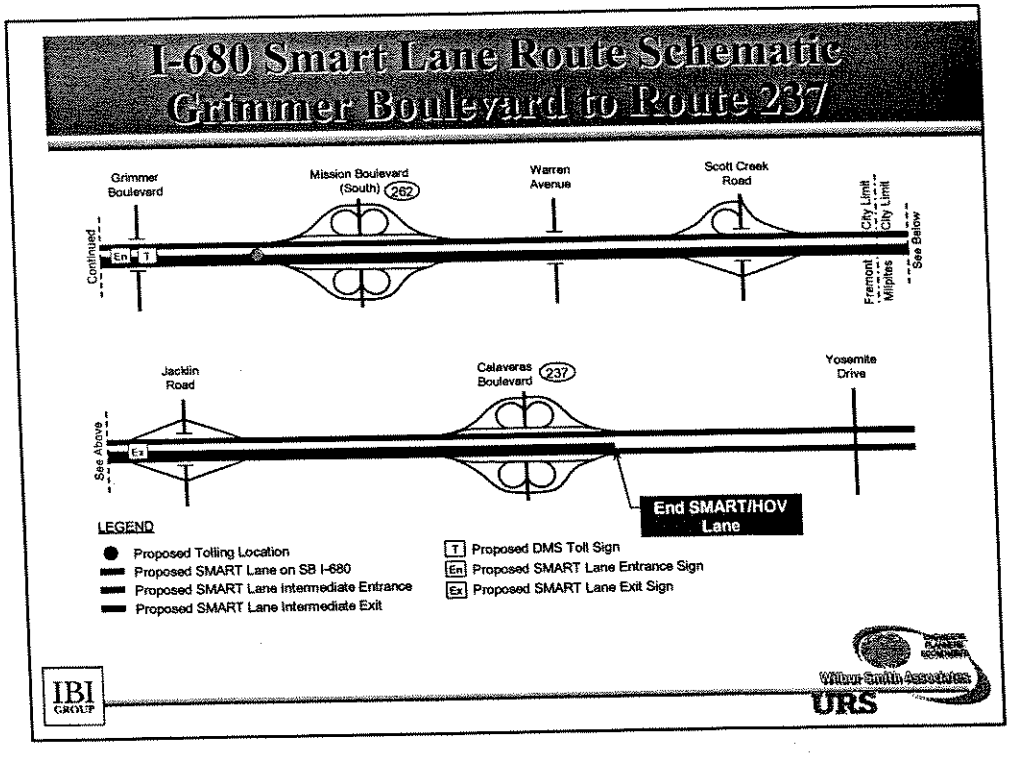
I-680 Smart Lane Route Schematic
Grimmer Boulevard to Route 237
Grimmer Boulevard
Mission Boulevard (South)
262
Warren Avenue
Scott Creek Road
City Limit
City Limit
See Below
Continued
En
T
Fremont
Milpitas
Jacklin Road
Calaveras Boulevard
237
Yosemite Drive
See Above
Ex
End SMART/HOV Lane
LEGEND
Proposed Tolling Location
Proposed SMART Lane on SB I-680
Proposed SMART Lane Intermediate Entrance
Proposed SMART Lane Intermediate Exit
T Proposed DMS Toll Sign
En Proposed SMART Lane Entrance Sign
Ex Proposed SMART Lane Exit Sign
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User Benefits of I-680 Smart Lane Project

- Transit vehicles, carpools, motorcycles and other eligible vehicles can still use the HOV lane for free and without degraded service
- Provide SOVs with an opportunity to use excess capacity in the HOV Lane for a fee
- Provide Toll-Paying SOVs with a more reliable trip
- Operate the HOV Lane efficiently
- Reduce traffic in the mixed-use lanes

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Use of Technology in Support of Smart Lane Operations

- FasTrak ETC System Transponders, Antennas and Readers (Title-21 Compliance)
- Vehicle Detection Stations
- Dynamic Pricing
- Dynamic Message Signs
- Toll Data Center/Transaction Processor
- Closed Circuit TV
- System Enforcement Tools
- Communications Network
- Integration with Caltrans Traffic Management Center
- Integration with BATA Regional Customer Service Center (RCSC)

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Agency Roles for the I-680 Smart Lane Operation

- Joint Powers Agency
- Bay Area Toll Authority
- California Department of Transportation
- California Highway Patrol

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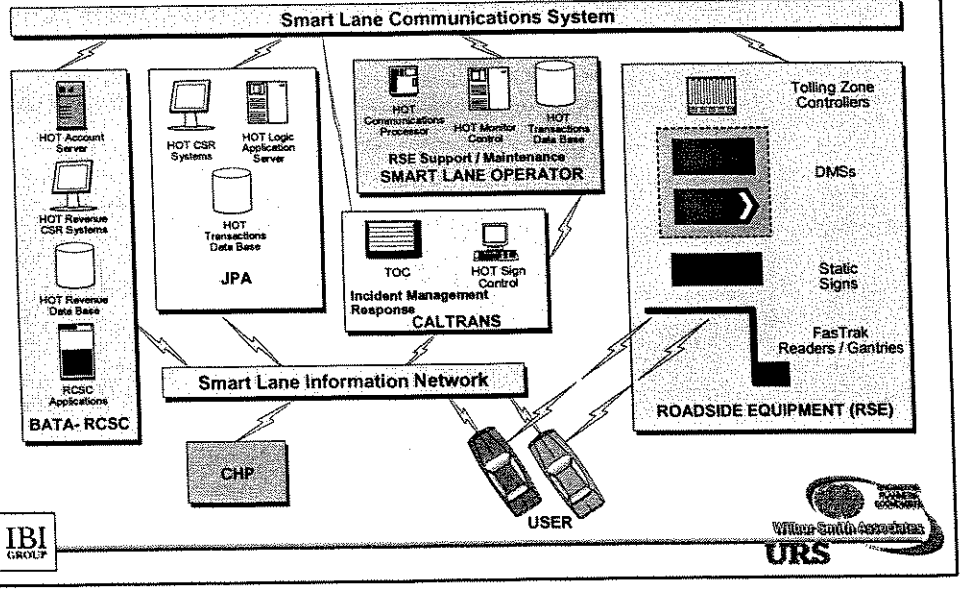
I-680 Smart Lane System Architecture



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BATA Regional Customer Service Center

Smart Lane customer service will be equal to that of Fastrak; no duplication of effort

- **RCSC hours of operation from 7 AM to 7 PM weekdays, 9 AM to 1:00 PM Saturdays**
- **Interactive Voice Response System and Call Center available 24 hours/day**
- **Website Access**
- **Mailroom**
- **FasTrak Account Management System, including customer data privacy protection**

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Design Recommendations for the I-680 Smart Lane

	Smart Lane Design Item	Basis of the Recommendation
1.	24/7 Hours of Operation *(Charge for off-peak use will be determined later)*	Simplified approach for public usage, ease of enforcement and easily transferable to other Smart Lane facilities. *This will limit access to lane that is currently available during non-peak hours.*
2.	Controlled access to the Smart Lane through designated entrance and exit points	Toll technology and dynamic pricing can be deployed easier and more cost-effectively. *This means limited access will replace the continuous access to carpools available today.*
3.	Location of ingress and egress points will provide access to the majority of customers	Ingress and egress locations were chosen based upon the largest traffic movements and geometric and safety considerations
4.	Smart Lane buffer zone soft barrier design	Lane striping reduces cost and the use of transition lanes may improve operations
5.	Dynamic pricing will be utilized	Real-time ability to set toll rates to ensure LOS "C" or better is maintained per State law
6.	The Smart Lane user will never pay more than the DMS indicates	This will prevent misunderstanding with Smart Lane users over the charged toll

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Design Recommendations for the I-680 Smart Lane (Cont.)

	Smart Lane Design Item	Basis of the Recommendation
7.	Dynamic message signs (DMSs) will convey toll amount to customers	Use of DMSs will allow the Smart Lane users to know what the toll rate will be
8.	Use CCTV to monitor tolling zones	Enhance safe operation of the system
9.	CHP use of enforcement transponders and mobile readers	Assist CHP with visual inspection
10.	BATA will process Smart Lane toll transactions	Provide full interoperability with FasTrak for Smart Lane users as legislatively required
11.	BATA CSRs to answer FasTrak questions and JPA CSRs to answer Smart Lane queries	Better address Smart Lane questions
12.	Registered Hybrid Vehicles will be allowed to use the lane, but at what toll remains to be determined	Legislation requires registering Hybrid Vehicles to have a FasTrak transponder and pay a toll when crossing Bay Area toll bridges, but is silent regarding toll lanes.
13.	Pavement maintenance (Caltrans) ETS maintenance (JPA)	Caltrans owns the roadway JPA is legislatively responsible for the ETS

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Design Recommendations for Approval

1.	24/7 Hours of Operation *(Charge for off-peak use will be determined later)*	7.	Dynamic message signs (DMSs) will convey toll amount to customers
2.	Controlled access to the Smart Lane through designated entrance and exit points	8.	Use CCTV to monitor tolling zones
3.	Location of ingress and egress points will provide access to the majority of customers	9.	CHP use of enforcement transponders and mobile readers
4.	Smart Lane buffer zone soft barrier design	10.	BATA will process Smart Lane toll transactions
5.	Dynamic pricing will be utilized	11.	BATA CSRs to answer FasTrak questions and JPA CSRs to answer Smart Lane queries
6.	The Smart Lane user will never pay more than the DMS indicates	12.	Registered Hybrid Vehicles will be allowed to use the lane, but at what toll remains to be determined
		13.	Pavement maintenance (Caltrans) ETS maintenance (JPA)

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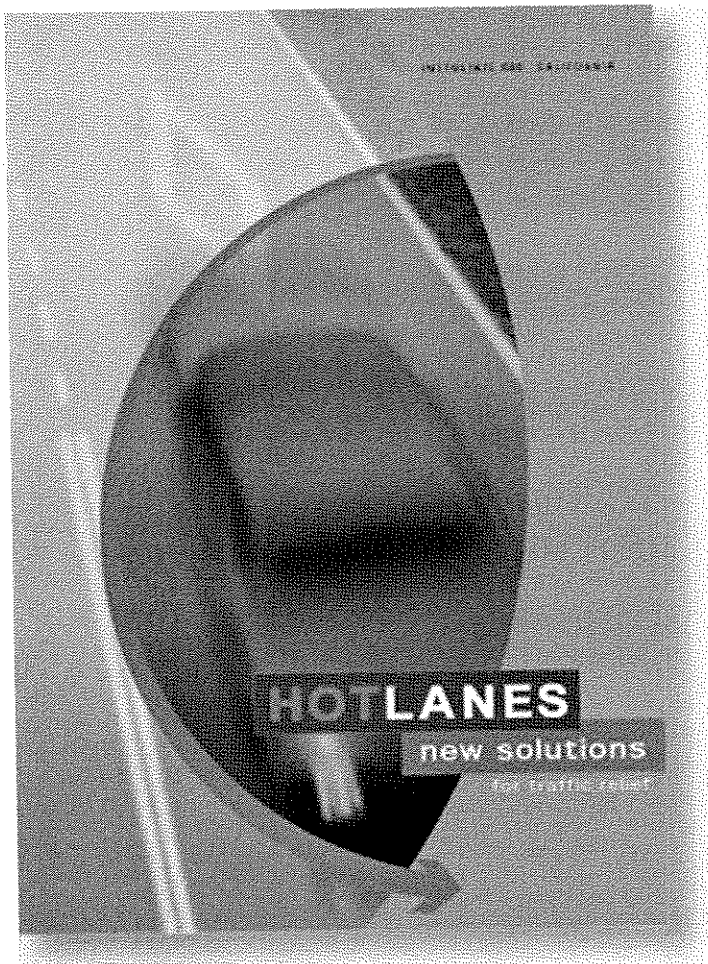
September 1, 2005
Agenda Item 4.0
Attachment 2



Southbound I-680 Smart Carpool Lane Concept of Operations

Submitted to:

Alameda County
Congestion Management
Agency

Submitted by the
Partnership Team of:

ENGINEERS
PLANNERS
ECONOMISTS
Wilbur Smith Associates

IBI GROUP

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Southbound I-680 Smart Carpool Lane Concept of Operations

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and

IBI GROUP

URS

July, 2005

TABLE OF CONTENTS

TABLE OF CONTENTS i
TABLE OF FIGURES iii
TABLE OF ACRONYMS iv
1. EXECUTIVE SUMMARY 1
1.1 INTRODUCTION 2
1.2 Current I-680 Southbound Traffic Problems 2
1.3 Current Conditions in Off-Peak Traffic Hours 2
1.4 Reaction of I-680 Users to the Concept of Smart Lanes 2
1.5 I-680 Smart Lane Management and Technology Solutions 3
1.6 Marketing the I-680 Smart Lane 5
2. Current System 6
2.1 Existing Facility Conditions 6
2.1.1 Overview 6
2.1.2 Major Interchanges 6
2.1.3 Off-Peak Conditions 6
2.2 Law Enforcement 6
2.3 Traffic Management System 7
2.3.1 Overview 7
3. Concepts for the I-680 Smart Lane System 8
3.1 Project Limits 8
3.2 Dynamic Pricing 8
3.2.1 Introduction 8
3.2.2 Congestion Pricing Calculation 8
3.3 Operational Parameters 12
3.4 I-680 Smart Lane Overview 13
3.5 Overview of Technology Configuration 17
3.5.1 Motorist's View 18
3.5.2 I-680 Smart Lane Data Communications Network 19
3.5.3 Smart Lane Communications System Requirements 22
3.5.4 Primary Nodes Physical Location 23
3.5.5 Communications Network Topology 24
3.6 Smart Lane Agency Roles 25
3.7 A Closer Look at the Toll System 28
3.7.1 Title-21 Compliance 29
3.7.2 Transponders 29
3.7.3 Dynamic Message Signs (DMSs) 30
3.7.4 Roadside Tolling Zone Sites 30
3.7.5 Closed Circuit Television Cameras 30
3.7.6 Tolling Zone Controller 31
3.7.7 Vehicle Detection Stations 31
3.7.8 Transaction Processor 31
3.7.9 JPA Application Graphical User Interface (GUI) with the Smart Lane 31
3.7.10 Smart Lane Enforcement 32
3.8 Central Account Management System 33

3.8.1 Regional Customer Service Center (RCSC) 33
3.8.2 FasTrak Account Management 35
3.8.3 Interactive Voice Response (IVR) System 39
3.8.4 Revenue Management 39
3.8.5 Account Management System Reporting 41
3.8.6 Financial Controls and Processes 41
3.8.7 RCSC System Access 42
4. Concept for Marketing the I-680 Smart Lane 43
4.1 Introduction 43
5. Analysis of the I-680 Smart Lane System 44
5.1 Disadvantages and Limitations 44
5.1.1 Transponder Reads in Non-HOV Lanes 44
5.1.2 HOV Lane Congested 44
5.1.3 HOV with Transponders 44
5.1.4 Lost, Stolen and Invalid Transponders 45
5.1.5 Enforcement 45

TABLE OF FIGURES

Figure 1 – I-680 Smart Lane Concept.....Page 15
Figure 2 – Smart Lane Intermediate Entrance/Tolling Zone Concept.....Page 15
Figure 3 – Smart Lane Intermediate Exit Concept .....Page 16
Figure 4 - Smart Lane System Overview.....Page 17
Figure 5 - Communications Node Connectivity .....Page 19
Figure 6 - Facility Communication Node Addresses Page 22
Figure 7 - Facility Locations Page 23
Figure 8 - Structural Diagram of I-680 System Page 24
Figure 9 - Smart Lanes Logical Diagram Page 25
Figure 10 - Agency Mapping Scenario Page 26
Figure 11 - Mobile Enforcement reader Diagram Page 32

TABLE OF ACRONYMS

ACCMA	Alameda County Congestion Management Agency
BATA	Bay Area Toll Authority
AMS	Account Management System
AVI	Automatic Vehicle Identification
CAD	Customer Account Database
CALTRANS	California Department of Transportation
CHP	California Highway Patrol
CCTV	Closed-Circuit Television
CSR	Customer Service Representative
CMS	Changeable Message Signs
DMS	Dynamic Message Sign
DSRC	Dedicated Short Range Communication
FHWA	Federal Highway Administration
ETC	Electronic Toll Collection
ETS	Electronic Toll System
FAQ	Frequency Asked Questions
GUI	Graphical User Interface
HOT	High Occupancy Toll
HCM	Highway Capacity Manual
HOV	High Occupancy Vehicle
HTML	Hypertext Markup Language
IVR	Interactive Voice Response
JPA	Joint Powers Agency
LOS	Level Of Service
LTD	Largest Traffic Density
MER	Mobile Enforcement Reader
MPH	Miles Per Hour
MTBF	Mean Time Between Failure
NSF	Non Sufficient Funds
PDF	Portable Document Format
PIN	Personal Identification Number
RCSC	Regional Customer Service Center
RF	Radio Frequency
ROW	Right of Way
RSE	Roadside Equipment
SOV	Single Occupant Vehicle
SR	State Route
TD	Traffic Density
TMC	Traffic Management Center
TDC	Toll Data Center
TP	Transaction Processor

TPS	Transaction Processor System
TZ	Tolling Zone
TZC	Tolling Zone Controller
VDS	Vehicle Detection System
WAN	Wide Area Network

1. EXECUTIVE SUMMARY

In order to provide better traffic flow on I-680 in Alameda County, a southbound high occupancy vehicle (HOV) lane from just south of the State Route (SR) 84 Interchange near Pleasanton to just south of Calaveras Boulevard (SR 237) in Milpitas will be improved and converted to a high occupancy toll (HOT) lane as part of the Southbound I-680 Smart Carpool Lane Project. The California Legislature under AB 2032 and the Federal Highway Administration (FHWA) authorized this conversion as a pilot project to improve travel efficiency in the corridor and provide more options to individual travelers. The Alameda County Congestion Management Agency (ACCMA), which is one of the three regional organizations that comprise the Joint Powers Agency (JPA), as called for in AB 2032, has been tasked and authorized to convert the existing HOV lane in the southbound direction to a HOT lane as described herein. This conversion project is referred to as the Southbound I-680 Smart Carpool Lane Project (Smart Lane). The California Department of Transportation (Caltrans) is responsible for the design and construction of the Southbound I-680 Standard HOV lane.

I-680 was selected for this project since it is expected to experience significant traffic congestion during the morning peak period at the time in which the project will be opened to traffic. Conversion of the I-680 corridor HOV lane to the Smart Carpool Lane will be accomplished by utilizing proven technology, traffic engineering expertise, and the concept of dynamic pricing with the goal of more efficiently using existing roadway capacity and improving traffic flow and travel times in the corridor.

Under this concept, transit users, carpoolers, motorcycles and selected other eligible vehicles will continue to be able to use the Southbound I-680 Smart Carpool Lane (Smart Lane) for free. Solo drivers who want a more convenient and reliable trip can choose to use the Smart Lane for a fee. The fee that is charged will vary depending upon the level of congestion in the Smart Lane itself and, possibly, the time of day. Two-axle, small trucks will also be allowed to use the new converted facility for a fee, but trucks with 3 or more axles will not be allowed to use the Smart Lane. This managed toll lane concept has been successfully deployed in San Diego and Orange County, California as well as Houston, Texas and Minneapolis, Minnesota.

Under this Smart Carpool Lane concept:

- The new Smart Lane is expected to operate 24 hours a day, 7 days a week, in the southbound direction. However, the final decision on operating hours has not yet been determined. State legislation currently requires that the hours of the Smart Lane be consistent with the operating hours of the HOV lane.
- Tolls will vary based on real-time traffic levels on the Smart Lane to ensure that traffic flow will be maintained at Level of Service (LOS) "C" or a LOS "D" with Caltrans approval.
- The toll price will be posted on highly visible dynamic message signs (DMSs) which will be located just before the entrances to the Smart Lane to allow single

occupant vehicle (SOV) motorists to choose whether or not to use additional capacity in the lane for a fee.

- Static signs will clearly identify the entrance and exit points of the Smart Lane.
- The tolling operation will be fully electronic, with no means for cash payments for each trip.

1.1 INTRODUCTION

This section provides an overview of the corridor and key aspects of the future Smart Lane operation. It discusses the current problems associated with growing traffic congestion on I-680, existing law enforcement and traffic management capabilities; a concept for the proposed Smart Lane electronic toll system (ETS); the opening and management of customer accounts; and the marketing of the system to the traveling public.

1.2 CURRENT I-680 SOUTHBOUND TRAFFIC PROBLEMS

In September 2003, the ACCMA completed the *Interstate 680 Value Pricing Feasibility Study* (Study). The Study found that traffic congestion on I-680 continues to grow. During the A.M. peak hours of 6:00 A.M. to 9:00 A.M., segments of the southbound lanes of I-680 become congested and drop below a LOS "D". The existing HOV lane is currently underutilized during the A.M. peak-traffic period by both carpools and transit vehicles. These conditions could result in increased driver frustration and slower travel times in the corridor. The excess HOV Lane capacity could be utilized in a more effective manner by allowing SOVs to use the HOV lane for a fee.

1.3 CURRENT CONDITIONS IN OFF-PEAK TRAFFIC HOURS

At this time, no significant traffic congestion problems occur during off-peak hours on the southbound lanes of I-680.

1.4 REACTION OF I-680 USERS TO THE CONCEPT OF SMART LANES

During the preparation of the Study, public reaction to the Smart Lane was sought through focus groups and a public opinion poll. The focus group participants supported the Smart Lane as an option to improve the current and future traffic operations of I-680. The idea of dynamic pricing and of collecting tolls utilizing a FasTrak transponder and electronic toll collection (ETC) system was perceived as fair by the focus group participants, especially if excess revenue could be used to fund additional transit service and improvements in the corridor.

In general, corridor users polled for the Study indicated they would be willing to pay a fee ranging anywhere from $0.25 to $7.00 to use the Smart Lane, with $7.00 being the maximum per trip rate. On the basis of what was learned from these focus groups, the I-

680 Smart Lane concept outlined in this document appears to be highly marketable and will benefit users by providing a safe, smooth, and reliable commute on southbound I-680.

1.5 I-680 Smart Lane Management and Technology Solutions

The primary goals of the I-680 Smart Lane Project are to:

1. Better utilize the HOV lane to improve traffic throughput in the corridor; and
2. Institute an additional revenue stream to help pay for transportation improvements in the corridor.

Presented below are several important issues pertaining to the Smart Lane conceptual development, management and technology solutions that are under consideration.

User Benefits. Implementation of a southbound Smart Lane is expected to provide four important benefits to the motoring public in the region:

1. Carpools, express buses, motorcycles and selected other eligible vehicles will continue to be able to use an efficiently operating HOV lane for free;
2. The I-680 Smart Lane will add a limited number of toll-paying SOVs to the converted lane. The number of additional SOVs will be controlled by the amount of the toll that is dynamically calculated;
3. The new lane will provide SOV drivers with a new option of paying for a faster, more reliable trip during the times when it is important and necessary for them to arrive at their destination sooner; and
4. The toll revenue generated by the Smart Lane will help pay for operation and maintenance of the facility and other transportation improvements in the corridor.

Law Enforcement and Traffic Management. Law enforcement and traffic management for the I-680 corridor is already in place, including a Traffic Management Center (TMC), which is located in Oakland and is operated by Caltrans. The TMC provides maintenance dispatch, California Highway Patrol (CHP) dispatch and traffic operations, utilizing a minimum number of closed-circuit television (CCTV) cameras for off-site observation of traffic patterns.

Enforcement of the Smart Lane toll through the use of a valid FasTrak transponder will reside with the CHP who will be provided mobile enforcement readers and enforcement transponders to support their enforcement effort. To verify proper operation of transponders, a portable reader will be available at the FasTrak Regional Customer Service Center (RCSC), which is operated by the Bay Area Toll Authority (BATA).

Technology. Under the proposed Smart Lane concept, the targeted LOS will be maintained at level "C," or "D" (with Caltrans' approval) with the implementation of the following proposed technology solutions:

- Dynamic pricing will control the toll rate based on the level of congestion in the Smart Lane. Toll rates will increase as the traffic in the Smart Lane increases and will be assessed based on differences from day-to-day and period-to-period;
- The number of access points to and from the Smart Lane will be limited to pre-designated locations;
- Approximately 28 vehicle detection stations (VDS) will be installed along southbound I-680 Smart Lane and will continually monitor total traffic density and speed in the Smart Lane;
- The technology configuration will involve the use of DMSs that will display the current toll rate ahead of the Smart Lane access points;
- A communication network will be implemented to support the Roadside Equipment (RSE) sites that read FasTrak transponders. The RSE sites, which are also referred to as Tolling Zones, will be equipped with a Tolling Zone Controller (TZC). The TZC, which will include a computer, will manage the transponder detection process (ETC antennas and readers), vehicle detection, system communications, data collection at each tolling zone, data storage and the periodic transmission of tolling zone data to the Toll Data Center (TDC);
- The Transaction Processor (TP) subsystem, which will reside at the TDC, will merge individual transaction records into single, one-way trips;
- Tolls will be collected through the use of FasTrak transponders and account management services will be performed by BATA's RCSC. The RCSC will handle FasTrak account management activities, distribution of transponders, payment processing, security/access and other ETC system financial functions; and
- The TDC, which will be owned and operated by the JPA, will collect the tolling zone ETC transactions, develop trips from the transaction records and transfer toll trip data from the I-680 Smart Lane system to the BATA RCSC for FasTrak account processing. Smart Lane trip data will be sent on, at least, a daily basis. BATA would then provide payment to the JPA based upon the Smart Lane trip records that were sent for processing.

The overall toll system, which will be owned and operated by the JPA, will consist of the roadway equipment, the transaction processor, the toll data center, central processing components, and various system enforcement tools. The system will manage traffic on the Smart Lane through dynamic toll rate setting. This will be accomplished through the near real-time monitoring of traffic flow on the Smart Lane to establish appropriate toll rates to either encourage or discourage SOV use of the lane.

Back Office Processing by BATA. The FasTrak RCSC is located in San Francisco and is operated by BATA. Prospective customers are able to open a FasTrak account and secure a transponder in person, by phone, mail or through the BATA website using a credit card, check or cash. It is expected that the same methods of account payment will be offered to the I-680 Smart Lane customers.

The RCSC provides a complete customer account and relationship management capability including automated interactive telephone system, state of the art account management and statement preparation, correspondence and document management, etc.

BATA customer service representatives (CSRs) are trained in efficient account management, problem solving and customer relationship management. All customer calls pertaining to the FasTrak program will be fielded by BATA RCSC customer service staff. All FasTrak program questions will be answered by the BATA CSRs and any Smart Lane operations related questions will be transferred to the TDC so they can be handled by the JPA CSRs.

Smart Lane (FasTrak) customers will have the ability to manage their accounts on-line via the BATA account management system (AMS). This secure business management system is a fully integrated system used to manage toll revenue accounting, customer accounts and communications, FasTrak transponder inventory, reporting requirements and customer service through a web-based interface. The JPA will institute their own website that will describe the I-680 Smart Lane system and operations. The JPA website will contain a link that will allow people to access the BATA website to offer them an opportunity to query their FasTrak account. The BATA website will contain a link that will allow motorists access to the JPA website so they can learn about the Smart Lane operation, policies and business rules.

1.6 MARKETING THE I-680 SMART LANE

The marketing of the I-680 Smart Lane will define the unique experience of using the new service and include user perceptions about the ease of use, safety, reliability and customer service. The details of the marketing program will be provided in a Marketing Plan that will consist of an analysis of marketing conditions, definition of the market and audience, and a key issues outline. The Marketing Plan will also establish a mission and objectives for the marketing program and likely recommend an integrated campaign supported by media and advertising.

2. CURRENT SYSTEM

2.1 EXISTING FACILITY CONDITIONS

2.1.1 Overview

In September 2003, the ACCMA completed the *Interstate 680 Value Pricing Feasibility Study* (Study). This Study formed the basis for requesting and securing state legislation (AB 2032, Dutra 2003) to construct the Smart Lane as a pilot project. The Study analyzed Smart Lane operations in Years 2000 and 2025 for a no-build/HOV only condition and two build alternatives. Given the current economy in the Silicon Valley, the traffic along the corridor has not yet returned to the Year 2000 level, which is a probable level for the I-680 Smart Lane opening. Year 2000 is considered an acceptable equivalent to a 2010 forecast. FHWA is agreeable to this approach since:

1. The project is considered a pilot with a limited statutory life span of 4 years from the date that tolls are first collected;
2. The Statute requires an evaluation of performance within 3 years of opening; and
3. The Smart Lane will be the first of its kind in California so data is not available to improve the accuracy of the current traffic forecast.

The Study's traffic analysis of the corridor's average A.M. peak-traffic period in the southbound direction indicates fewer than expected vehicles are currently using the new HOV lane. This level of HOV use leaves capacity in the lane that can be utilized by toll paying SOVs and, thereby, improve both their travel time as well as that of the mixed-flow vehicle operators.

2.1.2 Major Interchanges

There are three major interchanges along the I-680 corridor that introduce a significant amount of traffic to the corridor. These interchanges are the Mission Boulevard North (SR 238), the Auto Mall Parkway and Mission Boulevard South (SR 262). During the A.M. peak hours, a large volume of traffic enters the southbound lanes at these points as many of these motorists are traveling to jobs in Southern Alameda County and the Silicon Valley.

2.1.3 Off-Peak Conditions

During off-peak hours all southbound lanes of I-680 operate at or below capacity, therefore, there are no significant congestion problems.

2.2 LAW ENFORCEMENT

The CHP enforcement levels for the I-680 HOV are equivalent to the HOV lane enforcement levels in the Bay Area. This operation is managed out of the Dublin CHP office.

2.3 TRAFFIC MANAGEMENT SYSTEM

2.3.1 Overview

The I-680 corridor is monitored, analyzed and managed through a traffic management system that is based at the Caltrans' TMC in Oakland. The TMC's primary purpose is to integrate Caltrans' incident, maintenance and construction dispatch with the CHP dispatch into a unified communications center. This integration provides the necessary communications and computer infrastructure for coordinated transportation management on the region's roads during normal commuting periods, during special events and when major incidents occur. The TMC, which is operated by Caltrans, collects data about existing road and traffic conditions using intelligent transportation system methods and a variety of hardware, including vehicle detection stations that will be installed along the I-680 Smart Lane corridor.

There are currently no vehicle detection stations, ramp metering equipment or CCTV equipment along the I-680 Smart Lane corridor. In addition, Caltrans does not currently have any changeable message signs (CMSs) installed along the I-680 corridor.

3. CONCEPTS FOR THE I-680 SMART LANE SYSTEM

3.1 PROJECT LIMITS

The project will cover the length of the existing southbound I-680 HOV lane, which currently extends about 14 miles from just south of the State Route (SR) 84 Interchange in Pleasanton in the north to just south of Calaveras Boulevard (SR 237) Interchange in Milpitas in the southern part of the facility. The Smart Lane access points will be limited to increase vehicle throughput along this section of I-680, to improve enforcement and to simplify the electronic tolling system.

3.2 DYNAMIC PRICING

3.2.1 Introduction

The goal of the Smart Lane is to allow the unused capacity of the existing HOV lane to be used by SOV drivers paying a toll without compromising the use of the lane by carpools, transit vehicles, motorcycles and other eligible vehicles. SOV passenger vehicles and 2-axle trucks, up to a maximize weight of 10,000 pounds, will be allowed to use the Smart Lane for a fee if there is available capacity in the lane to sell. Therefore, the HOV lane must be kept free-flowing during times of normal traffic movement.

The number of SOVs entering the Smart Lane must be carefully and continuously managed in order to keep the traffic flowing at an LOS of "C" or better in the southbound HOV lane. SOV access to the Smart Lane will be controlled through the adjustment of the toll. The toll rate will be calculated based upon the level of traffic congestion in the Smart Lane. Toll rates will increase as traffic increases in the Smart Lane to regulate the number of vehicles so that traffic will remain free-flowing at a LOS of "C" or better. Conversely, the toll rate will decrease with decreasing levels of congestion in the Smart Lane to allow more SOV motorists to "buy in" to use the additional capacity of the Smart Lane.

As the SOV motorist approaches an entry point to the Smart Lane, a dynamic message sign (DMS) will display the current toll rate for use of the lane. At each Smart Lane entry point, one or two specific rates will be displayed on the DMS to inform the motorist what toll amount will be assessed if they travel either to an intermediate exit or to the end of the facility. If the SOV motorist enters the Smart Lane, the toll amount observed on the sign will be the maximum paid regardless of any rate changes that might occur while the motorist is utilizing the lane. The toll rate is "locked in" for each SOV motorist based upon the point and time of entry.

3.2.2 Congestion Pricing Calculation

The level of traffic congestion in the Smart Lane will be determined by accumulating traffic data from within the lane. Approximately 28 Vehicle Detection Systems (VDSs), installed about one half mile apart, will be deployed in the Smart Lane. The data

gathered from these VDSs will be used in the toll rate calculation. The Smart Lane system will collect the traffic volume and speed information and determine if a toll rate change is necessary to either encourage or discourage additional SOV traffic.

The traffic volume is defined as the number of vehicles passing a certain point within an established time period. The traffic volume must be combined with the average speed of the vehicles because a low vehicle count alone could indicate either low congestion or, when the road is heavily congested, slow moving traffic. Therefore, traffic congestion measurement will be based upon a combination of traffic volume and speed data. The LOS targeted for the Smart Lane is "C", as defined in the *Highway Capacity Manual (HCM)*, which is published by the FHWA. Based upon the HCM, data from the *Interstate 680 Feasibility Study, September 2003,* indicates that at peak times approximately 550 vehicles per hour per lane travel at speeds higher than 55 miles per hour in the HOV lane. This translates to a LOS "B".

Traffic data will be collected over a defined interval (e.g. 5–15 minutes). The levels of service will be determined by a parameter called Traffic Density (TD). The traffic density (vehicles/mile/lane) will be computed from vehicle counts and speeds as follows:

Traffic Density = ((C/P)*3600)/(S*N)

Where: C = The total vehicle count over the period.
P = Length of the measurement period in seconds.
S = Average measured vehicle speed over the period in MPH.
N = The number of lanes in operation at this tolling zone in this traffic direction.

Traffic density is correlated to LOS using the following table, which is based on data obtained from FHWA.

Traffic Table	
Level Of Service	**Traffic Density** (Vehicles/Lane/Mile)
A	0–11
B	>11–18
C	>18–26
D	>26–35
E	>35–45
F	>45

For example, a six-minute count of 120 vehicles traveling in an HOV lane at 55 miles per hour (MPH) would result in a traffic density of 21.8 or LOS "C" ((120/360)*3600)/55*1). This would translate into 1,200 vehicles per hour, or 118% more vehicles than were utilizing the I-680 HOV lane during peak times at the time of the Study.

Traffic densities at a single VDS may be impacted by environmental or geometric conditions and, therefore, misrepresent the actual traffic condition within a segment of the Smart Lane. To address any misrepresentation, a coefficient must be determined and applied to any affected TD. Below is an example of how the weighted TD would be calculated. In this example, the North Tolling Zone may have a higher coefficient than the other tolling zones, to account for its geometric conditions (e.g. length and grade). The table of coefficients would contain one row for each Smart Lane entrance or sign location and one column for each tolling zone. In this case there is a direct correlation between tolling zones and entrance locations.

Tolling Zone Coefficients – Southbound from Andrade Road to Mission Blvd.			
	Smart Lane Entrance Points		
	Point 1 Andrade Road	**Point 2** Washington Blvd.	**Point 3** Mission Blvd.
North Tolling Zone (Andrade Road)	1.2	1.1	1
Central Tolling Zone (Washington Blvd.)	0	1.1	1
South Tolling Zone (Mission Blvd.)	0	0	1

The TD is used in the toll rate setting function, so that the toll rate will adjust up or down based upon the change in the TD. The change in the TD is the current TD minus the previously calculated TD. Small TD deviations might result in small or no change to the toll rates. Large deviations will typically result in large changes to the toll rates.

In addition to determining the TD at each VDS location, the variation of TD along the Smart Lane due to the impacts of traffic entering and exiting the facility will be considered. This is necessary to manage the number of vehicles entering the Smart Lane at any given point and to reduce their impact on downstream congestion. This will be accomplished by assigning each VDS to a specific entry point for the calculation of the toll rate.

Traffic and revenue studies conducted prior to opening the Smart Lane will be used to determine TD average rates of change throughout the day. A table will then be created that assigns a toll increment to each rate of change within each LOS range of TDs.

Toll rate increments for changes within LOS "A" and "B" will be small, but increments for LOS "C" will be higher. As the TD approaches the upper end of "C", the rates would climb high enough to discourage additional paying SOVs from entering the lane. The toll rate would become prohibitively high if LOS "C" were exceeded. The toll rate table process will be designed to easily adjust the toll to reflect actual traffic conditions after the Smart Lane is opened.

The computed toll rates will be determined from the following:

- The current charging rate;
- The LOS represented by the maximum TD at the downstream tolling locations;
- The largest traffic density (LTD) of the previous toll rate adjustment period; and
- The toll rate that is assigned to the change in LTD.

The system will compute the TD at each VDS downstream from each tolling location and then select the LTD.

$LTD_n = MAX(A_{n1}*TD_1, A_{n2}, *TD_2, \ldots A_{nj}*TD_j)$

> Note: Where $A_{n,j}$ represent a set of definable coefficients, there is one set of coefficients for each Smart Lane entrance location; each member of the set is used to multiply the traffic density in its tolling zone in a manner that reflects the characteristics of that particular zone. The arrangement presumes that there are "n" Smart Lane entry points and "j" tolling zones in the direction of travel. MAX (. . .) represents a function that selects the largest member from a set of values.

The LTD values for each 30-second period are collected over a fixed time period (e.g. six minutes) and the average of these LTDs is the final TD for the selected period.

The system will compute a toll rate adjustment for the entry point based on the computed final TD discussed above. The new toll rate will be determined by adding the incremental toll adjustment found in the TD rate of change table to the current toll. The following table illustrates the adjustment function for TDs in LOS "C":

LOS "C" Delta Settings

Level of Service Delta Settings

TD	Δ1	Δ2	Δ3	Δ4	Δ5	Δ6
20	0.00	0.25	0.50	0.75	1.00	1.25
21	0.00	0.25	0.50	0.75	1.00	1.25
22	0.00	0.25	0.50	0.75	1.00	1.25
23	0.00	0.25	0.50	0.75	1.00	1.25
24	0.00	0.25	0.50	0.75	1.00	1.25
25	0.00	0.25	0.50	0.75	1.00	1.25
26	0.00	0.25	0.50	0.75	1.00	1.25
27	0.00	0.25	0.50	0.75	1.00	1.25
28	0.00	0.25	0.50	0.75	1.00	1.25
29	0.00	0.25	0.50	0.75	1.00	1.25

A new LTD of 24 and a LTD from the previous period of 20 would produce a change of 4 (Δ4). Reading across the row for the new LTD of 24 to the column with the heading Δ4 would give the rate increment of $0.75. Thus, $0.75 would be added to the current rate producing the new rate. If the change in LTD is negative, the rate would be decreased.

Traffic increase patterns are not the inverse equivalent of traffic decrease patterns. Therefore, toll rates should not increase in the same manner as they decrease. To account for this difference, a minimum and maximum toll rate for each LOS will be established. As the toll rate is incrementally adjusted, these minimum and maximum toll rates will be used to ensure that the calculated rate does not change dramatically in a short period of time.

3.3 OPERATIONAL PARAMETERS

It is assumed that the number of access points to and from the Smart Lane will be limited to pre-designated locations. These access points will be striped as either entrances or exits to or from the Smart Lane. This approach should improve operations and safety by discouraging continuous weaving between the Smart Lane and the mixed-use lanes. Additionally, limiting the number of access points reduces the number of tolling zones, simplifies enforcement efforts and simplifies motorist's understanding of how toll rates

are assessed. It is assumed that the I-680 Southbound Smart Lane operation will be 24 hours per day, seven days a week, pending an official decision by the JPA.

Tolls will be assessed using FasTrak transponders, so toll-paying vehicles will be required to have a transponder in good standing. The Smart Lane operation will not require any changes to current FasTrak operations.

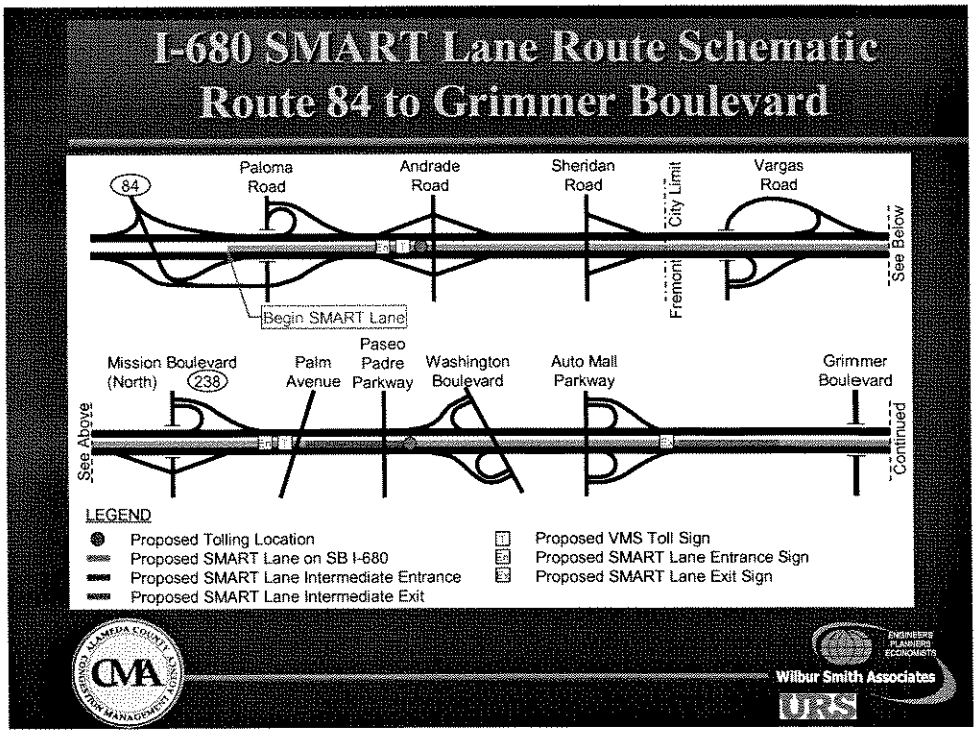
To meet the mandated goal of maintaining a LOS "C" for carpools, transit vehicles, motorcycles and SOV patrons, the system will require the use of dynamic pricing, as described above.

Current California legislation allows the following vehicles to utilize the Smart Lane without paying a toll:

- Carpools with 2 or more passengers;
- Express buses;
- Motorcycles;
- Low emission vehicles; and
- Registered hybrid vehicles.

3.4 I-680 SMART LANE OVERVIEW

Figure 1 is a schematic diagram that shows the proposed preliminary roadway system configuration for the I-680 Smart Lane. As noted above, the project will cover the southbound I-680 travel corridor from Calaveras Road on ramp at the north end to just south of Calaveras Boulevard at the southern end of the facility. Figure 1 is broken into 2 segments, the first shows the project routing from SR 84 to Grimmer Boulevard and the second schematic shows the Smart Lane conceptual layout from Grimmer Boulevard to SR 237. Based upon a very preliminary assessment of access requirements, the proposed points of access and egress are depicted in this schematic.



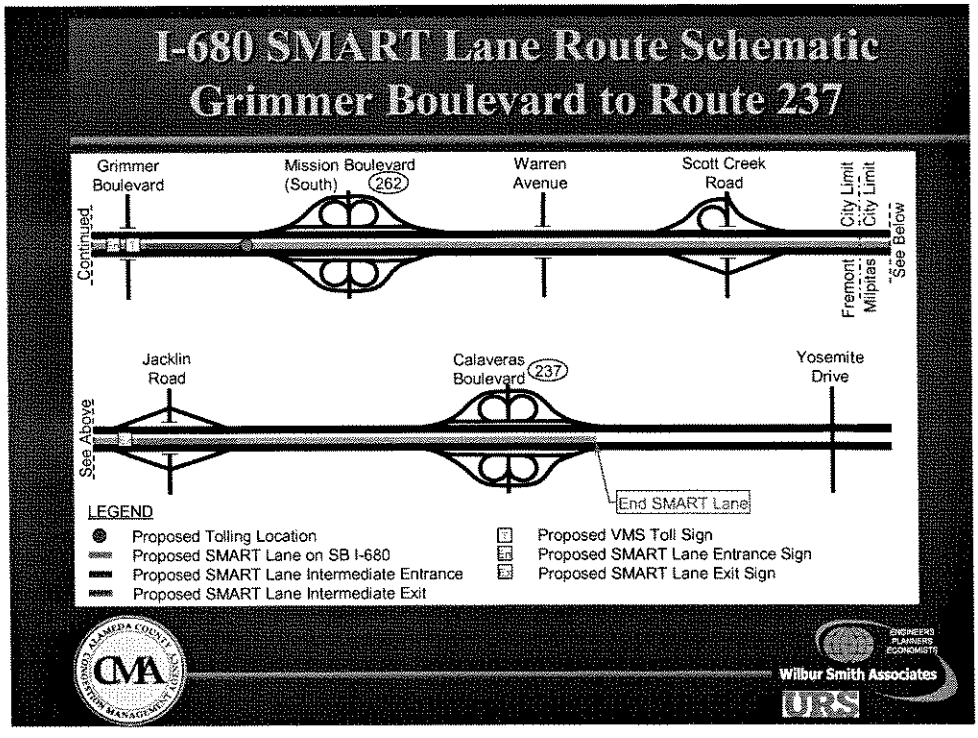


Figure 1 – I-680 Smart Lane Concept

The schematic shows the selected locations for tolling zones. The tolling zone locations will be at the northern terminus just north of Andrade Road, just north of Washington Boulevard and just north of Mission Boulevard South (SR 262). The schematic also shows the preliminary anticipated location of the various signs. This includes both static signs in advance of each access point, as well as dynamic message toll-rate signs situated approximately one quarter mile upstream of each entry point to the Smart Lane.

As described above, the Smart Lane system will make use of new JPA VDSs that will continually monitor total traffic volumes and speeds in the Smart Lane. This data will be obtained directly from the new VDSs that will be designed, procured and deployed by the ETS Contractor. Wherever possible, existing Caltrans VDSs will provide traffic density data to the Smart Lane ETS. This Caltrans data, which will be transmitted from the TMC, will be used only for back-up purposes in case any of the new VDSs fail to provide the required data.

Figure 2 shows a typical Smart Lane intermediate entrance/tolling zone concept. In this diagram, traffic flows from left to right. Vehicle operators in the mixed-flow lanes would first see the Smart Lane entrance advisory sign, which would have a static legend providing advance notice of an upcoming entry point to the Smart Lane. Immediately prior to a vehicle's entering the Smart Lane, a DMS will display the current toll rate applicable for that entry point at that time. The tolling zone itself will be located just downstream from the access point.

The design of the entrance point includes a 300-meter auxiliary lane, enabling vehicles to merge into the HOV/Smart Lane safely and just prior to traversing the tolling zone. This transition lane will be constructed within the existing Caltrans right-of-way (ROW).

Figure 3 shows a typical Smart Lane Intermediate Exit Concept. Vehicles already in the Smart Lane will have an opportunity to exit at specific locations separated from entry points. A static sign, typically mounted on the median barrier just prior to the exit point, would advise motorists where to exit the Smart Lane in order to access downstream interchanges. Similar to the entrance/tolling zone site, a 300-meter transition lane will be constructed enabling vehicles to exit the HOV/Smart Lane and to merge back into mixed-use lanes safely. This design can be implemented within the existing Caltrans ROW.

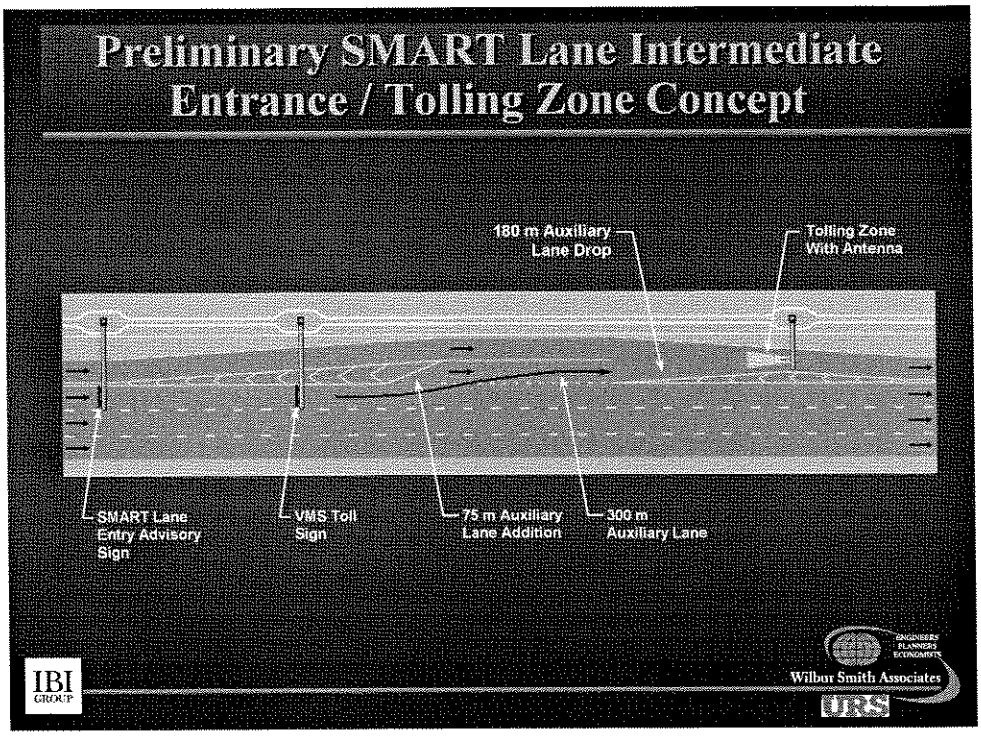


Figure 2 – Smart Lane Intermediate Entrance/Tolling Zone Concept

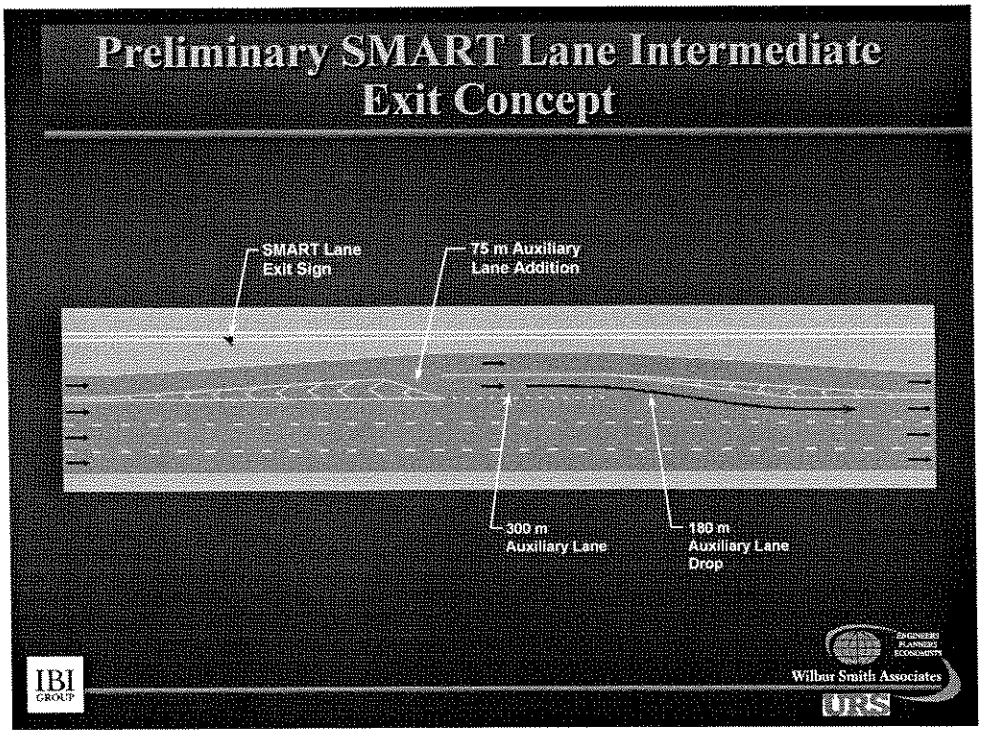


Figure 3 – Smart Lane Intermediate Exit Concept

3.5 OVERVIEW OF TECHNOLOGY CONFIGURATION

This section provides a functional overview of the Smart Lane technology configuration. The basic system would consist of the following elements:

- Onboard devices (FasTrak transponders);
- Roadside tolling zone sites, which will be equipped with ETC antennas, ETC readers, tag read indicator lights and tolling zone controllers);
- Vehicle detection stations;
- DMSs that are used to display the toll rate currently in effect;
- Closed Circuit Television (CCTV);
- The Toll Data Center;
- Smart Lane user interface to the Caltrans TMC;
- A FasTrak account management and customer service system; and
- Vehicle Detection Stations.

Figure 4 provides an overview of the Smart Lane System Layout. The overall Smart Lane System is broken down into five major subsystems presented below:

- **Tolling Zone (TZ) Systems** – All of the roadside equipment, including the ETC antennas, ETC readers, controller units, indicator lights and gantries are located within the TZs. The primary activities that occur at the TZs are the detection and identification of transponders, development of transactions, collection of VDS data (for those VDSs directly linked to the TZ), storage of the TZ data and transmittal of the transactions to the TDC for processing;
- **Smart Lane Toll Processing System** – This system, including the Smart Lane System Operator, consists of the computers that receive the VDS data, operate the dynamic pricing module, develop the Smart Lane trips, produce a record for each toll trip, format the trip records according to BATA requirements and transmit the trip records to the BATA RCSC for processing;
- **FasTrak Account Management System** – The BATA RCSC will receive and process all of the Smart Lane toll trip records, provide FasTrak account maintenance for Smart Lane customers, receive and process FasTrak program membership applications, distribute transponder kits to new customers, provide Smart Lane (FasTrak) customer reports and other information to the JPA and have CSRs answer FasTrak Program queries;
- **Incident Response/Safety System** – This subsystem will be operated by the Caltrans TMC and will include the provision to change the DMS messages to direct motorists in case incidents occur on southbound I-680 requiring utilization of the Smart Lane for purposes other than normal HOV or toll-paying SOV traffic. When an emergency situation has been cleared, the TMC operator will manually return the management of the Smart Lane back to the JPA; and

- **HOV Enforcement System** – This subsystem includes CHP enforcement of the Smart Lane using several enforcement tools, including special transponders and mobile reader devices that will be mounted on CHP vehicles.

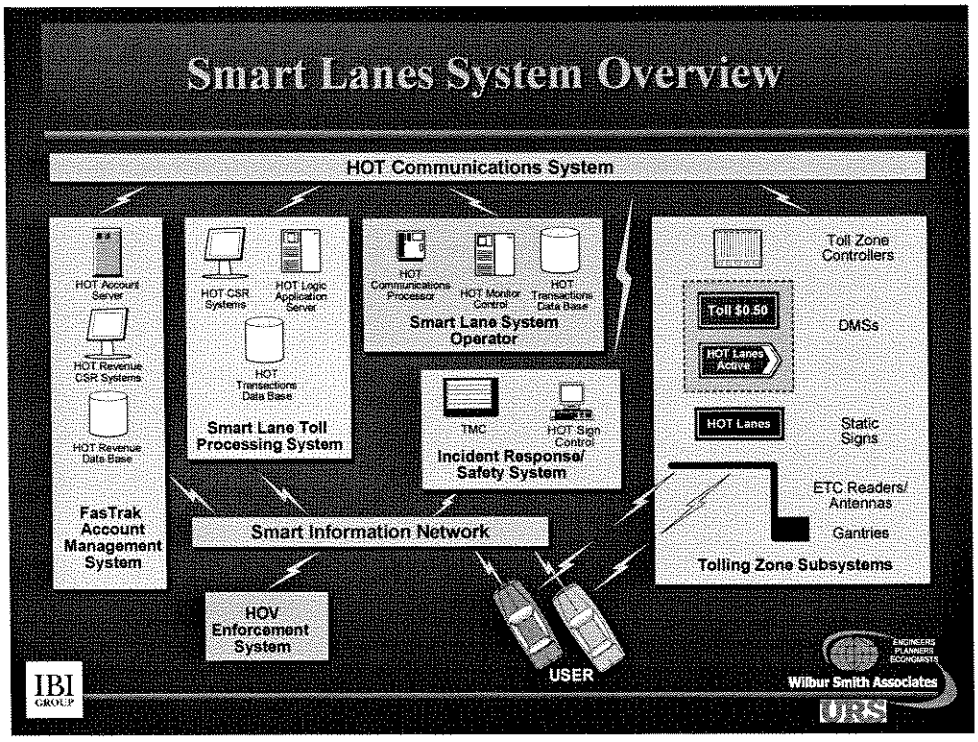


Figure 4 Smart Lane System Overview

3.5.1 Motorist's View

The motorist's view of the Smart Lane system will be straight forward. Carpool, express buses, motorcycles and other authorized vehicles will continue to travel in the HOV lane at no charge. SOV operators must have a valid FasTrak account, a properly installed transponder and pay a toll for use of the Smart Lane.

While driving in the mixed-use lanes of I-680, motorists will view DMSs that are placed in advance of entrance points to the Smart Lane will indicate the current toll for use of the lane. At the northern Smart Lane entry point the DMS will show two toll rates; one for travel to the first exit and the second for travel to both the second exit and the southern end of the Smart Lane. At the second entrance point, the DMS will show two toll rates; one for travel to the first exit and the second for travel to both the second exit and the southern end of the Smart Lane. At the third entrance, the DMS will show one toll rate which is the rate to travel to the second exit or to the end of the Smart Lane.

All vehicles that enter the Smart Lane will travel through the tolling zone and the ETC antennas will detect the presence of FasTrak transponders. Tolling points are placed as close as possible to the entry point (and the accompanying DMS) to ensure that the driver is charged no more than the rate that is displayed on the sign at the time of entry. The motorist will, in most cases, be charged the exact toll rate that is displayed prior to their entry into the Smart Lane. In rare cases, the motorist may be charged a lower rate depending upon whether or not the dynamic pricing algorithm is in the process of raising or lowering the toll rate at the same instance in which the motorist is traveling under the DMS. In any case, the motorist will never be charged more than the toll rate that is displayed on the DMS prior to the entrance of the Smart Lane.

A "time offset" might be established to allow for adequate travel time from the DMS to the tolling zone in the event that the toll rate has changed between the time in which the DMS displayed the toll rate and when the driver traverses the tolling zone. This "time offset" cannot exceed the toll rate change interval.

The Smart Lane SOV drivers will be alerted when a toll has been collected by an audible signal from the transponder. Motorists whose vehicles are equipped with a transponder and who want to use the Smart Lane as an HOV must properly "shield" their transponder to prevent having tolls charged to their account. Their transponder will need to be shielded by the motorist placing it into the protective anti-static bag, which is provided to FasTrak customers when they join the ETC Program. FasTrak account holders are provided with complete instructions on the use of the anti-static bag at the time they establish their account.

The Smart Lane customers will be able to access their FasTrak account status and monitor their toll-paying activity either in person at the RCSC, via the telephone or on-line by utilizing the BATA FasTrak website.

3.5.2 I-680 Smart Lane Data Communications Network

The ETS consists of roadside equipment for the monitoring of traffic flow, control of dynamic message signs and the detection of transponder equipped vehicles. All of this equipment will be connected to the TDC via a communications network which handles the data transmission process. In addition, the BATA RCSC will be connected to the TDC via a communications network. Due to the importance of monitoring traffic conditions in real time and collecting traffic density information in a timely manner, a reliable, secure and highly available communications network is essential to the Smart Lane application.

Presented below are the various communication system nodes that will be required for the Smart Lane operation:

- Tolling Zone Subsystem Nodes;
- Toll Data Center Node;
- BATA Regional Customer Service Center Node;

- Caltrans Traffic Management Center Node; and
- JPA/Smart Information Network Nodes.

Presented in Figure 5 is a schematic that shows the different communication node connectivity required to support Smart Lane operations. A more detailed description of each individual node and how it fits into the overall Smart Lane communication system follows.

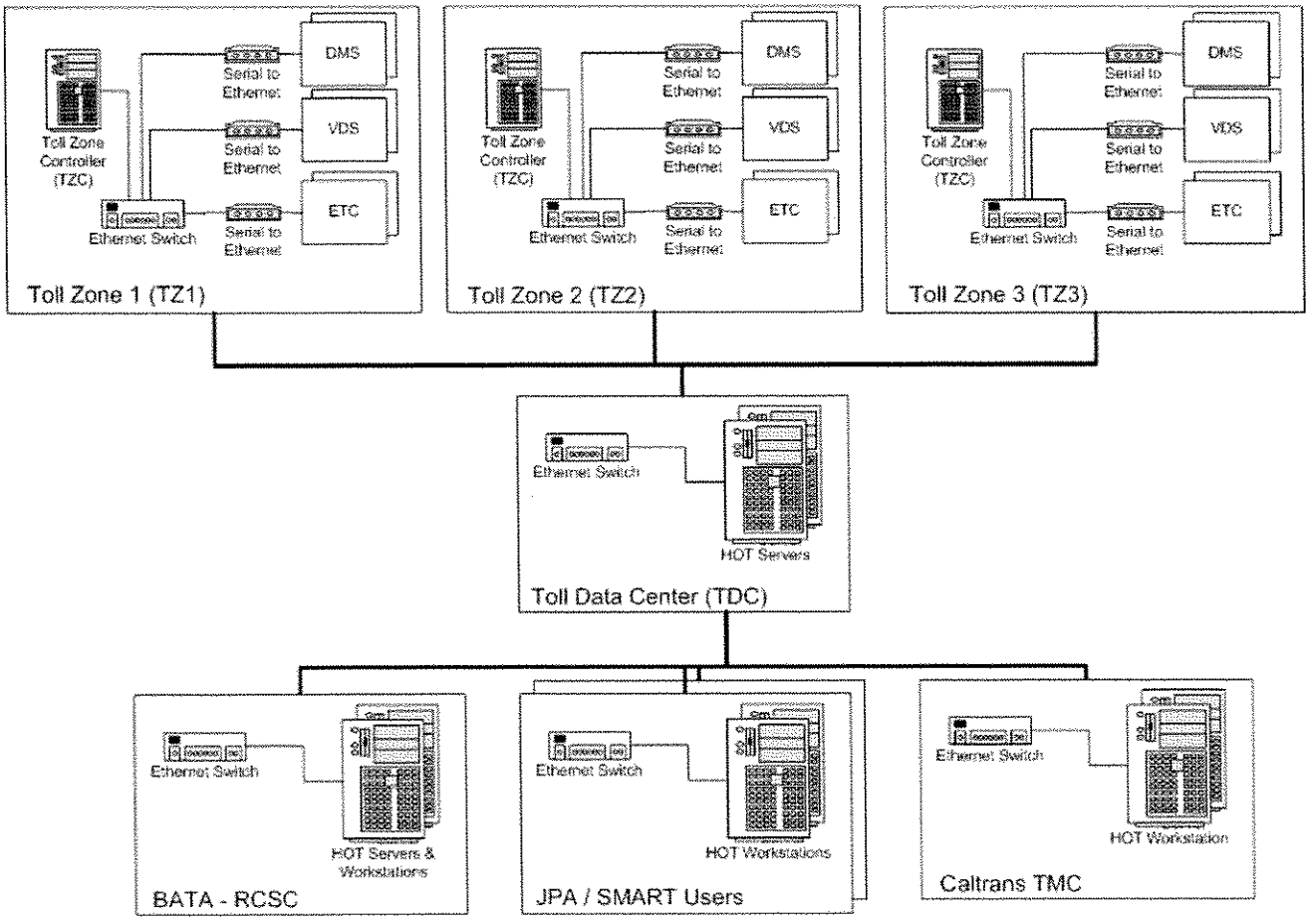


Figure 5 – Communications Node Connectivity

3.5.2.1 Tolling Zone Subsystem Nodes

The Tolling Zone subsystem nodes will manage communications to the TDC and between all equipment that is installed at the designated roadside TZs as well as other devices that are located along the corridor in the vicinity of the TZs. The local field equipment includes, as a minimum:

- Tolling Zone Controllers;
- ETC Readers;
- ETC Antennas;

- DMSs;
- VDSs that are installed nearby one of the TZs); and
- CCTV cameras.

3.5.2.2 Toll Data Center Node

Toll Data Center node will manage the following communication links:

- TDC to the Tolling Zone Controllers;
- TDC to the BATA RCSC;
- TDC to the Caltrans TMC; and
- All TDC internal communication links to support:
  1. Dynamic pricing module;
  2. Trip transaction processor;
  3. Transaction validation database;
  4. Revenue transaction/reconciliation processors;
  5. Transaction database system (replication of TDC database); and
  6. Smart Lane TDC CSR workstations.

3.5.2.3 BATA Regional Customer Service Center Node

The BATA RCSC node will manage all internal communications to:

- The FasTrak customer account database;
- BATA CSR workstations;
- Interactive voice response (IVR) system;
- Transponder management subsystem; and
- Revenue collection subsystems.

The internal design and implementation of the RCSC communication links are the responsibility of BATA. The TDC node, which will be under the responsibility of JPA, will handle 2-way communications with the RCSC.

3.5.2.4 Caltrans Traffic Management Center Node

The Caltrans TMC node will manage all internal communications for:

- Remote control/override of the Smart Lane DMSs under emergency traffic circumstances;
- Remote monitoring of field Caltrans devices; and
- Monitoring of Caltrans CCTV camera feeds, if available.

The internal design and implementation of the TMC communication links are the responsibility of Caltrans. The TDC node, which is the responsibility of JPA, will handle all required 2-way communications with the TMC.

3.5.2.5 JPA/Smart Information Network Nodes

The JPA/Smart Information network nodes will communicate via a secure wide area network (WAN) which will provide pertinent information to other users, agencies and other entities, as might be required.

3.5.3 Smart Lane Communications System Requirements

Each of the network links that are identified in the communications node connectivity block diagram will be designed, as a minimum, to operate under the following system performance requirement criteria:

- Data Load - Data throughput requirements, which can be defined as the amount of data that can be passed across a communications link in a given period of time. The communications infrastructure will be capable of handling Smart Lane data records, transactions and transponder file downloads during peak periods.

- Capacity - The communications infrastructure will be capable of providing sufficient data capacity to meet the current data throughput needs, but will have sufficient capacity for the anticipated growth in the quantity of transactions and the possibility of servicing the northbound lanes of the I-680 Smart Lane Project.

- System Availability - Availability is defined as the percentage of network or system uptime versus total time. Typical values for high availability systems are 99.99% up to 99.999%. This corresponds to a total unscheduled downtime of 52 minutes per year and 5.2 minutes per year, respectively.

- Reliability - Acceptable values of mean time between failure (MTBF) of all communication equipment and each network link will be determined during the toll system design phase of the Smart Lane Project.

- Security - The communications infrastructure will be protected against physical damage, destruction, theft or replacement of hardware. Data security will be ensured through the use of secure communication protocols.

- Flexibility and Extensibility - The communications infrastructure design will ensure that future communication network enhancements can be easily and quickly implemented.

- Maintainability - Ease of maintenance is important for the Smart Lane project. The ability to easily configure the hardware and use plug-and-play replacement of components in the field is an important consideration.

- Interoperability - The ability to use different vendor equipment in the same network is important in order to maintain competitive pricing and for future proofing of the deployed networks. Standardization of the communication protocols would ensure interoperability.

3.5.4 Primary Nodes Physical Location

The Smart Lane Project presents a number of geographical and technological challenges due to the physical distance, terrain, and lack of existing network infrastructure in the vicinity of I-680. The following table provides the physical address of the various communication system nodes or, in the case of the three TZs, a selected address on a frontage street adjacent to the southbound travel lane at the planned location of the TZs.

Node Locations	Address
North Tolling Zone	6901 Mission Rd. Sunol, CA 94586
Central Tolling Zone	1901 Jackson Ct. Fremont, CA 94539
South Tolling Zone	45958 Research Ave. Fremont, CA 94539
Caltrans District 4	111 Grand Ave. Oakland, CA 94623
Bay Area Toll Authority RCSC	475 The Embarcadero (at Broadway) San Francisco, CA 94111
Toll Data Center (JPA)	1333 Broadway, Suite 220 Oakland, CA 94612

Facility Communication Node Addresses

Presented in Figure 6 are the geographical locations of the different Smart Lane Program facilities.

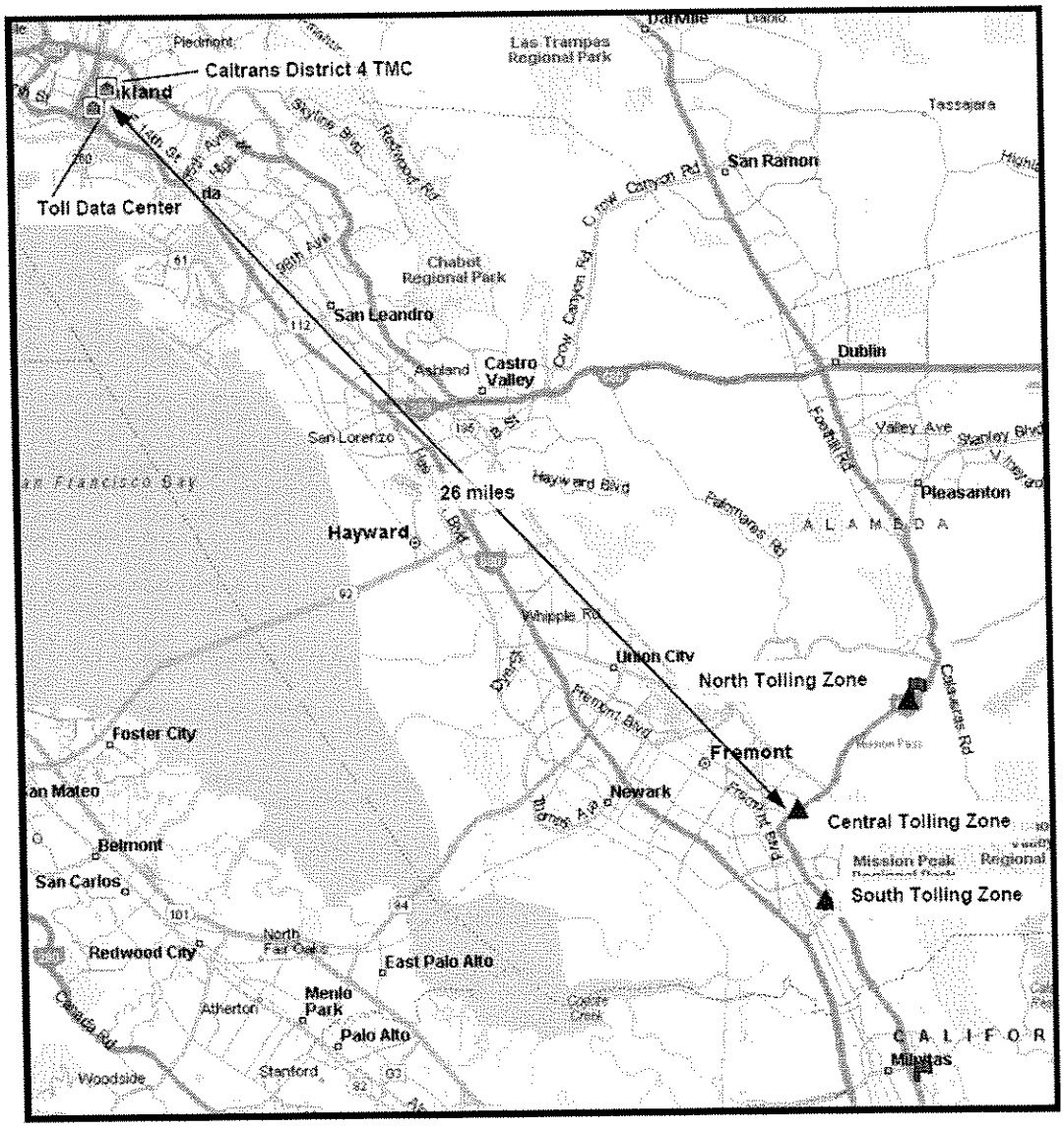


Figure 6 - Facility Locations

3.5.5 Communications Network Topology

The high level of network reliability necessary to maintain the real time monitoring of traffic flow in the Smart Lane will be achieved by implementing a hybrid of the ring and star network configurations. Figure 7 shows each of the TZs with a dedicated primary communication path to the TDC using leased communications.

In addition to this primary path, the network architecture will include secondary or redundant communication paths between the TZs. These paths will provide a failover or redundant route for communications back to the TDC. Since these paths are not a primary communications path under normal operating conditions, as would be the case in a traditional ring architecture, these paths can be implemented using a more cost-effective

technology, such as wireless, or possibly a lower data rate point to point leased line connection.

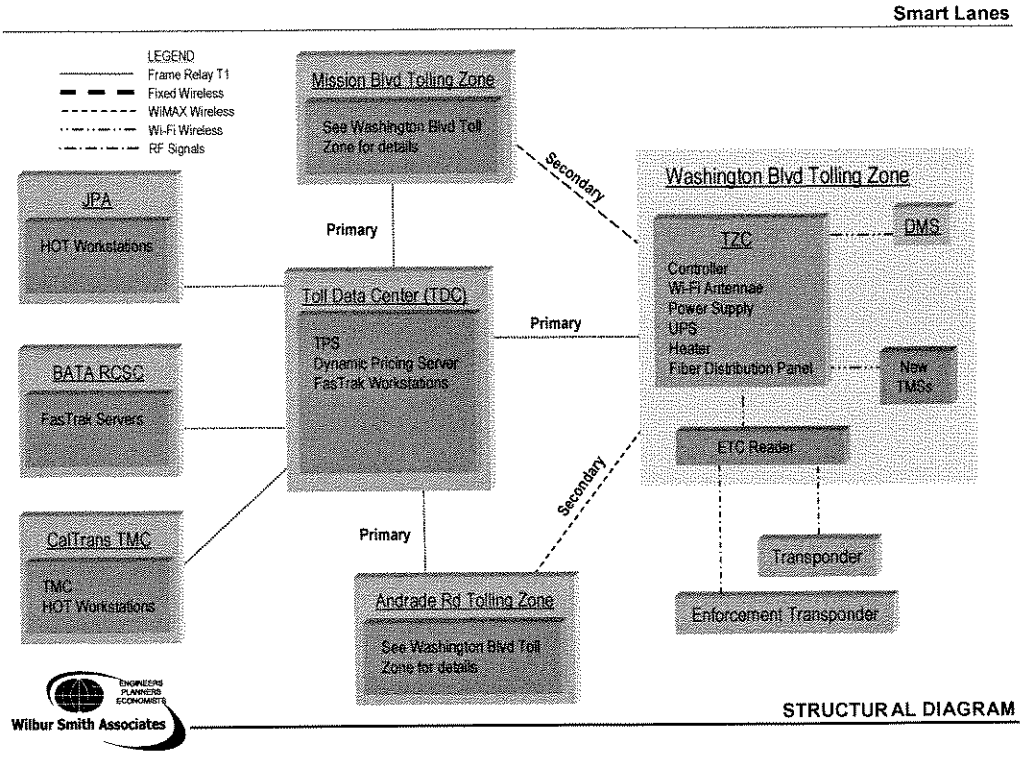


Figure 7 Structural Communications Diagram of I-680 System

3.6 SMART LANE AGENCY ROLES

The Smart Lane system will require a successful collaboration between several entities that will support the complete operation of the Smart Lane. This section presents a logical mapping (Figure 8) of the various subsystems and explains the various agency roles in operating them. These agencies include the JPA (including Smart Lane operations), BATA, Caltrans, and the CHP.

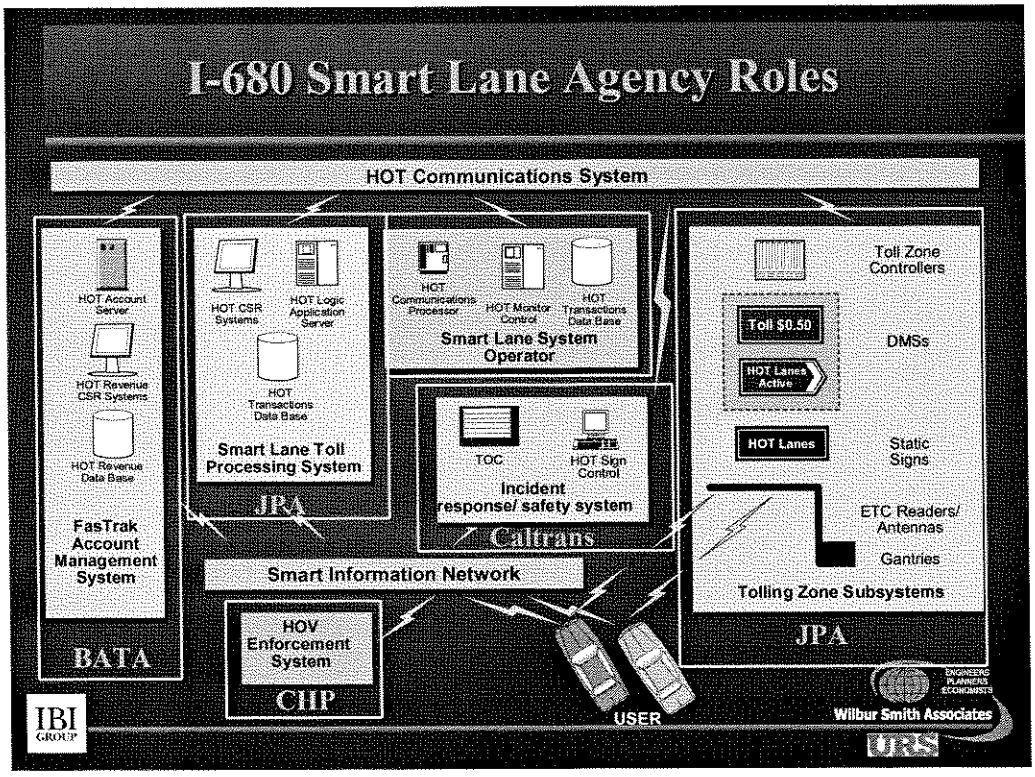


Figure 8 – Smart Lane Agency Roles

As depicted in this figure, each of the above identified agencies will be responsible for the operation of the functional subsystem in which they are associated.

The JPA will be responsible for the following:

- The Smart Lane toll transaction and trip generation processing, which would be located at the TDC, tolling zone device control and monitoring, TDC operations and maintenance;
- Operation, monitoring, maintenance and technical support of the tolling zone subsystems, including the ETC readers, antennas, DMSs, tolling zone controllers, CCTV equipment, the enforcement equipment that the CHP will utilize, and all equipment and components related data to the Smart Lane communications system;
- The dynamic pricing and toll rate management process;
- Smart Lane CSR functions and monitoring;

- Smart Lane financial reconciliation process with BATA;
- Providing Smart Lane System reporting;
- Monitoring the Smart Lane System Operator (if this option is chosen by the JPA);
- Handling traffic related operations (as required); and
- Performance evaluation of the Smart Lane operation within 3 years of system opening.

BATA will be responsible for the following:

- Full RCSC processing, including FasTrak account management, customer service interface to the public, Smart Lane trip record processing, and revenue management functions;
- Handle all aspects (except for some possible JPA marketing activities) of management of FasTrak accounts, transponder inventory/tracking, transponder fulfillment and revenue management;
- Provide support and maintenance for all back office subsystems; and
- Provide FasTrak revenue and account information to the JPA and, possibly, other involved agencies when required.

Caltrans will be responsible for the following:

- Operation, maintenance and support of the incident response and safety subsystem;
- Responsible for the Smart Lane DMS override if an emergency traffic situation arises; and
- Roadway maintenance.

The CHP will be responsible for the following:

- HOV/Smart Lane enforcement operation; and
- Receive Smart Lane/FasTrak related information via some type of vehicle mounted hand-held device from the TDC or from the tolling zones.

3.7 A CLOSER LOOK AT THE TOLL SYSTEM

This section presents the Smart Lane ETS concept, including the vehicle, roadway, central account management and customer interface points. A more detailed description of the major subsystems follows. Figure 9 provides a logical overview of the Smart Lane components and operations.

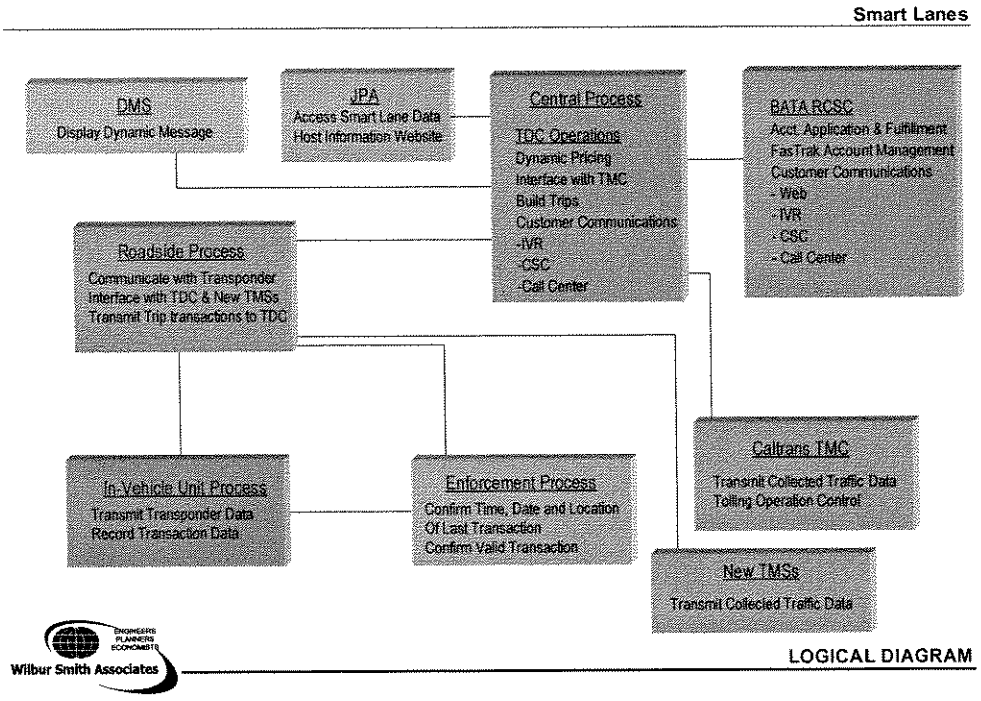


Figure 9 – Smart Lanes Logical Diagram

The ETS consists of two major functional blocks; the roadway components and the central processing components. The Smart Lane will also include various enforcement tools. The Smart Lane ETS is designed to allow the dynamic management of SOV traffic in the Smart Lane. This is accomplished through near real-time monitoring of traffic flow on the Smart Lane to establish appropriate toll rates in order to either encourage or discourage SOV use of the HOT lane.

The roadside subsystem consists of several major components, including transponders, roadside tolling zones, transponder read indicator lights, tolling zone controllers, DMS and VDSs.

The DMSs will be integrated with the TZCs through a fiber optic communication link. The TZCs will also be interconnected, through the TDC, with the Caltrans TMC in order to provide ongoing traffic data and to receive TMC operator override commands for lane operational status. The new VDSs will provide the ETS with continually updated traffic

volume and speed data on the Smart Lane in order to determine when periodic dynamic toll rate adjustments are required.

3.7.1 Title-21 Compliance

Title 21 has been established to ensure that any ETC system that is installed in the State of California will be interoperable with all current and any future ETC systems in the state. Title 21, as it pertains to the toll industry, is detailed in Chapter 16 of the California Code of Regulations entitled "Compatibility Specifications for Automatic Vehicle Identification (AVI) Equipment". This section requires that all AVI (also referred to as ETC) equipment installed in the state of California be compatible with the standards and regulations set forth in the code of regulations. This compatibility specification has been developed around two principal front-end components: a reader and a transponder. The specification defines specific equipment and communication specifications for both the reader and transponder as well as defines the messages and message format that should be communicated between the two devices.

The I-680 Smart Lane ETS will meet all Title-21 requirements of the toll system operational requirement standards that are in place in the Bay Area at deployment of the Smart Lane.

3.7.2 Transponders

The transponders are small electronic transceiver devices that are mounted on the inside of the vehicle's windshield typically behind the rearview mirror. In some cases it is necessary to utilize license plate mounted transponders for those vehicles with metallic windshields which cause radio frequency (RF) shielding inside the vehicle cab. They enable the unique identification and tolling of SOV motorists electronically using RF technology.

The transponder is battery powered and user installable. The transponder communicates with a roadside antenna and reader, which are installed at the tolling zones. Each transponder contains a unique serial number that identifies it to the ETS. This allows it to be associated to a driver's FasTrak account for paying the applicable toll.

The Smart Lane transponders will comply with all Title-21 requirements and utilize a Dedicated Short Range Communications (DSRC) protocol applicable for high-speed tolling.

The Smart Lane transponder communicates with the driver via audible tones. This allows the system to signal the driver that the transponder is working correctly. Under normal operations, a beep will be sounded each time an SOV's transponder is detected as the vehicle traverses the tolling zone. If the SOV driver does not receive this audible tone then they will need to contact the RCSC to check their account status and/or have their transponder inspected. If a FasTrak account holder is traveling on the Smart Lane as a

carpool, in order to not have their transponder read, they need to insert it into a protective anti-static bag.

3.7.3 Dynamic Message Signs (DMSs)

The Smart Lane will contain three (3) tolling zones. Each TZ will be preceded by one DMS. The total number of DMSs required to effectively support the Smart Lane system operations has yet to be determined.

It is anticipated that the Smart Lane DMSs will be LED-based message signs that are capable of displaying alphanumeric characters. The DMSs are a part of a composite sign comprised of a traditional static sign and the dynamic sign portion. The static portion will display general information about the Smart Lane and provide context for the DMS messages.

3.7.4 Roadside Tolling Zone Sites

The TZs will be equipped with ETC readers, ETC antennas, VDSs, transponder read indicator lights and a TZC unit. The antennas, which will be mounted on a gantry to about the centerline of the Smart Lane, will communicate with the transponders that are mounted in the SOV as it travels through the TZ. The TZ site will consist of one antenna and a roadside electrical cabinet that houses the ETC reader, a fiber-optic multiplexer and a power supply with battery backup.

Environmentally hardened equipment that is designed to withstand the weather conditions typically experienced in the Bay Area is to be located within the cabinets. Each cabinet is provided with electrical power and a communication source.

The ETC reader is connected to the antenna, which is mounted over the Smart Lane as described above. The reader is a Title 21 compliant transmitter/receiver unit capable of reading all transponders in the Smart Lane. The multiplexer allows the reader to communicate to the TZC. The power supply ensures that clean and reliable power is provided to the reader and multiplexer even in the event of a power outage of several hours.

All the components of the roadside system will be tied together via the tolling zone communications network.

3.7.5 Closed Circuit Television Cameras

CCTV cameras will be installed on a pole at each of the three TZ sites for the primary purpose of monitoring the TZ equipment and operations. The CCTV cameras will be standard freeway traffic monitoring cameras and will provide security at each TZ and will allow observation of any problems that might occur at these locations, anomalies in

traffic conditions and, possibly, DMS messages if they are installed within CCTV viewing range.

3.7.6 Tolling Zone Controller

The TZC is the primary roadside device (computer) that collects and stores transaction data and manages the communications between the readers, antennas, DMSs, TDC subsystem and the TMC operator application (through the TDC). The TZC is typically two independent computers; a primary unit that handles normal operations and a secondary unit that monitors the primary unit's status and is capable of taking over control in the event of a malfunction with the primary unit. This redundant design ensures that the tolling operation can continue despite a failure within the TZC subsystem.

3.7.7 Vehicle Detection Stations

There will be approximately 28 VDSs placed on the Smart Lane. The VDS will consist of equipment located on or along the I-680 Smart Lane approximately every half mile along the Smart Lane. The VDSs will collect information about traffic volume and speed and report the data back to the TDC, and possibly the TMC, at pre-determined intervals.

3.7.8 Transaction Processor

As toll transactions are received from the TZCs, they will be provided to the TDC-based Transaction Processor Subsystem (TPS). The TPS is responsible for the merging of individual transaction records into trip records, or what is typically referred to as trip formation or construction. The TPS will implement pre-defined business rules based upon reasonable travel times to determine whether or not the transaction records from the tolling zones should be formed into single or multiple trips. This subsystem will be located at the TDC and will be owned and operated by the JPA.

3.7.9 JPA Application Graphical User Interface (GUI) with the Smart Lane

The JPA will be provided with a Smart Lane application GUI that will offer predetermined options from which the Smart Lane operator can select. The application will allow the JPA to change the operational mode of the Smart Lane. There are four possible Smart Lane modes:

1. Closed to all traffic;
2. Open to HOV traffic only ($0.00 rate for HOV and all other vehicles are considered violators);
3. Open to HOV and SOV (with FasTrak transponders) traffic only (rate based on dynamic pricing); and
4. Open to all traffic ($0.00 rate for all, no violators).

All tolling mode overrides will be recorded by the TPS to ensure that the correct toll rates are utilized under each of the above identified operating modes. The ETS will also be capable of implementing prescribed operational procedures to revert the system back to normal tolling operation following these overrides.

TMC operator override of the Smart Lane will be performed under emergency conditions only and will include JPA staff input, if possible. The TMC operators will be able to change the operational mode of the Smart Lane but will not be able to change the toll rates that are set as part of the dynamic pricing process. Once an incident is concluded, the TMC operator will have to manually switch back to tolling mode.

3.7.10 Smart Lane Enforcement

The CHP will be responsible for enforcing the requirement that SOVs pay the appropriate toll through the use of a valid FasTrak transponder. Violators will be cited for violating the HOV 2+ occupant policy. The enforcement task requires the officer to determine visually the number of occupants within the vehicle. If there is only one occupant, the CHP Officer would then need to determine whether that vehicle operator is using a valid transponder. To simplify the enforcement task, the JPA may provide CHP with two enforcement tools; enforcement transponders and mobile ETC readers. These tools will allow the CHP to detect a transponder in a vehicle and also determine whether the transponder is linked to a FasTrak account that is in good standing.

The future Smart Lane will be delineated with striping to separate it from the mixed-use lanes. Therefore, CHP enforcement officers will need to remain mobile while patrolling for Smart Lane violators. This will require that the enforcement tools provided to the CHP function well while moving.

3.7.10.1 Enforcement Transponder

The enforcement transponders are regular ETC (FasTrak) transponders that are specially programmed to identify them as enforcement tags. The enforcement transponder operates at highway speeds as long as it is properly installed on the patrol vehicle windshield.

Officers with an enforcement transponder following directly behind an SOV traveling through a tolling zone would be alerted by an audio tone if the ETS detected a FasTrak tag in the SOV ahead of the patrol car. Conversely, if the ETS does not detect a valid FasTrak transponder in the front vehicle, the enforcement tag will not beep, thus signaling the Officer that the vehicle that he/she is following has violated the Smart Lane toll requirement provided the Officer confirms that the front vehicle is an SOV.

3.7.10.2 Mobile Enforcement Readers

A Mobile Enforcement Reader (MER) will permit Smart Lane enforcement activities by CHP Officers while traveling at highway speeds, but unlike the enforcement transponder, they do not need to be traveling in the Smart Lane through a TZ. The MER will be

mounted on the patrol vehicles and consists of an ETC reader, control/display unit and an antenna. The ETC reader is a transceiver that operates at 915 MHz frequency. The control/display unit is designed to be used while safely driving the patrol car and is mounted in the front seat of the vehicle within easy reach of the officer. A directional antenna will be mounted on the roof, or back trunk lid, of the patrol vehicle, pointing towards the left side of the vehicle. This would allow the MER to detect and confirm the proper operation of a FasTrak transponder in a vehicle driving alongside the enforcement vehicle. Figure 10 depicts a typical scenario in which a CHP vehicle is checking to see whether the vehicle traveling in the Smart Lane is equipped with a FasTrak transponder that is in good standing.

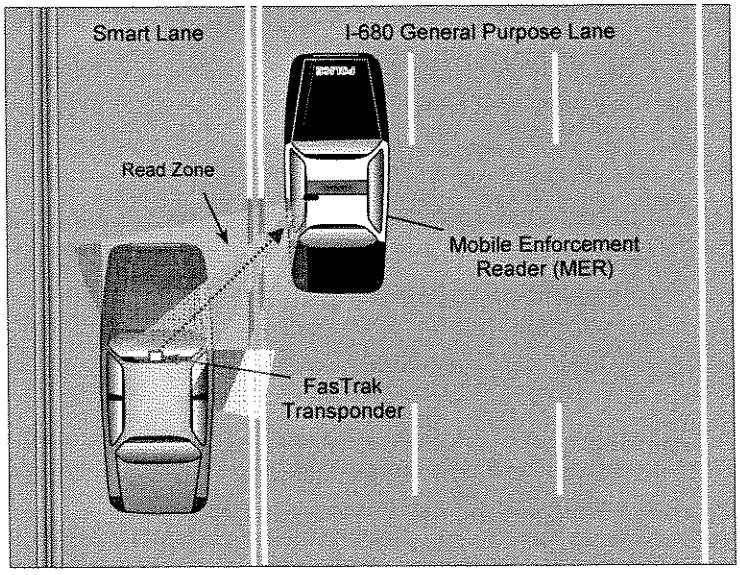


Figure 10 – Mobile Enforcement Reader Diagram

3.8 CENTRAL ACCOUNT MANAGEMENT SYSTEM

3.8.1 Regional Customer Service Center (RCSC)

The RCSC, which will be provided and operated by BATA, will have the following purposes:

- Perform all of the required FasTrak account management functions;
- Perform all of the required RCSC functions, including the Call Center, front desk for walk-in customers and processing (of new applications, reports, etc.);
- Interface to the TDC to allow JPA to send Smart Lane trips for posting to FasTrak accounts and for receipt of toll revenue from BATA; and
- Interface to the TDC for the transfer of Smart Lane customer inquiry calls.

3.8.1.1 Hours of Operation

The BATA RCSC maintains regular business hours. The BATA FasTrak account management and information website and IVR system will be available on a 24-7 basis.

3.8.1.2 RCSC Front Desk

The RCSC front desk allows customers to conduct a full complement of FasTrak account transactions. They will be able to make payments, add or exchange transponders, open accounts, close accounts, update other account information, etc. A drop-box is also available for walk-in customers who choose not to wait for personal assistance. The RCSC front desk is staffed during regular business hours.

3.8.1.3 Telephone System and Call Center

The BATA telephone system will process incoming customer calls. It includes an automated IVR system that routes calls via menu selections. The system enables customers to review their account balances, payments and toll usage at any time, 24 hours a day, 7 days a week. The system also provides messages containing general information. During hours of operation, callers have the option to transfer to a CSR.

3.8.1.4 Website Access

BATA will host a website that presents information about the FasTrak program and provides access to FasTrak patrons that will allow them to check their accounts, pending payments, recent transactions, previous statements, ask questions about the program, etc. The website will also provide information about all of the Bay Area toll facilities and allow prospective FasTrak members to sign up on-line.

The JPA will also host their own website that will present information about the I-680 Smart Lane project, describe the way that toll rates are assessed to SOVs, hours of operation, enforcement procedures, etc. The JPA site will also include a link that will automatically switch to the BATA website if customers have more specific FasTrak operational questions, want to check their account, wish to join the program, etc.

3.8.1.5 Mailroom

The BATA mailroom will be capable of printing, storing, enveloping and posting all customer related correspondence (statements, welcome kits, transponder fulfillment, etc.). The RCSC mailroom will also have the capability of opening and distributing all incoming mail for back-office processing.

3.8.2 FasTrak Account Management

Each customer account is associated with a number of basic attributes such as name, address, telephone number, e-mail address, credit card information, transponders and vehicles. This account management is currently in use by BATA.

The RCSC system allows for each account to be associated with an unlimited number of those related attributes. Changes to any of those attributes are automatically logged and the history of changes is available for viewing by the customer on the website or by a CSR using the RCSC application.

3.8.2.1 Account Management Business Rules

The Business Rules for Smart Lane customer account management will be identical to the other FasTrak customers handled by BATA.

3.8.2.2 Account Type

The RCSC will support different types of accounts, including:

- Smart Lane Personal Accounts; and
- Smart Lane Commercial Accounts.

A non-revenue type account is considered an attribute of each of these basic account types. Other types of accounts could subsequently be added pursuant to agreement of BATA (e.g., Airport parking, Airport access, etc.). All revenue-based account types will be pre-paid.

3.8.2.3 FasTrak Account Opening

The RCSC system supports the functionality for application submission by walk-up, website, mail, e-mail, phone or fax and for payment by cash, check or credit card. Potential new customers may make account inquiries at the RCSC, online or via the IVR system.

The deposit amount for the account opening is a configurable feature of the system depending upon the business rules that are established for the Smart Lane operation and are consistent with BATA guidelines. The amount can vary depending upon the method of payment, the number of transponders issued, account type, etc.

New FasTrak customers will be issued a transponder on the spot if they apply at the RCSC front counter. Otherwise, the transponder will be mailed to the new customer. In addition to the transponder, new Smart Lane customers will receive a welcome kit that will include, at a minimum:

- Description of the I-680 Smart Lane system and operation;

- Welcome letter (including the customer personal identification number (PIN) code to access the BATA website and IVR);
- Guidebook and frequently asked questions (FAQs);
- Transponder mounting instructions;
- Protective anti-static bag; and
- Velcro strips (or other transponder mounting devices).

3.8.2.4 Account Replenishment

Accounts may be established to be replenished either automatically via credit card, debit card or manually by cash, check, or one-time credit or debit card. The replenishment amount will depend upon the business rules that are set for the Smart Lane operations.

Automatic replenishment is performed as soon as the account balance drops below the specified threshold. Accounts configured for manual replenishment will automatically receive notification (by e-mail or mail) when the account balance reaches a specified threshold. The customer will be required to call-in, mail or bring payment equivalent to the replenishment amount in order to restore their FasTrak account to good standing.

3.8.2.5 Account Monitoring

The RCSC and the TPS will provide the ability to monitor and identify unusual and undesirable activity (e.g, negative balance or frequent replenishment). System processes will include the ability to generate notices, assess penalty fees, offer incentive programs and other remedial actions.

The most frequent situations are expected to be:

- Investigate negative and inactive accounts with the intent to collect and close;
- Establish a process for converting a negative customer account into an accounts receivable for collection purposes and write-off, as needed; and
- Proposing customized account types or plans to the customer.

3.8.2.6 Account Modifications/Updates

The Smart Lane customer will have real-time access to their account for updates and modifications either through the BATA website, IVR or the Call Center with a live CSR. The following information will be available:

- Personal information (including personal and billing addresses, phone numbers, e-mail, preferred contact method and time, etc.);
- Account type and plan (limited to CSR);
- Payment method modifications (switch to automatic replenishment, credit card update, etc.);
- Replenishment amount and threshold within set business rules;

- Transponder management (issuing new transponder, replacing non-working transponder, reporting a stolen transponder, returning a transponder, etc.);
- Vehicle information (including make, model, color, year, license plate);
- Customer password modification or reminder; and
- Any other comment about the account (complaint, etc.).

All changes to account attributes are logged to the RCSC database. The history of changes is available for viewing via online screens.

3.8.2.7 Account Suspension

The RCSC provides functionality for automatic deactivation and reactivation of all transponders associated with that account if the account is suspended and subsequently reactivated. The system automatically generates notices to customers in low or negative balance conditions. If the account balance becomes negative, all future transactions can be routed to Collection (depending upon the specific business rules).

As soon as the customer replenishes the account balance, the account and associated transponders return to an active/valid state.

3.8.2.8 Account Closure

Accounts may be permanently closed when:

- The customer requests it;
- The account balance remains negative for a predetermined period of time;
- The account has no activity for a predetermined period of time; or
- A transponder is used in an unauthorized manner.

The customer will either be issued a refund if the account has a positive balance or automatic collection activities will be initiated for customers with a final negative balance.

3.8.2.9 Access to Customer Data and History

The BATA and TDC CSRs will have online access to all relevant customer information, including account number, address, payment details and most recent transactions. Additionally, they can access the customer history and perform searches either in the transactions or the notes history, using different criteria including date period or type of event, or they can perform a text search on selected customer account attributes or information types.

3.8.2.10 Customer Statements

The RCSC will generate standard FasTrak customer statements on a monthly or quarterly basis for mailing to customers. These statements are produced as electronic files that can be submitted to an external statement printing and distribution facility or printed and mailed locally. Statements can also be generated electronically in hypertext markup language (HTML), portable document format (PDF) or Word format by a BATA CSR who can then fax or e-mail the statement to the customer upon request.

Upon request, the BATA or TDC CSR can view the actual statement that the customer received. This is an important feature in cases where the customer is seeking an explanation regarding certain fees or disputing specific transactions.

3.8.2.11 Customer Notices

The RCSC will have the capability to automatically manage customer notices. The customer notices will depend upon the business rules but the usual customer notices include, but are not limited to:

- Change in replenishment method;
- Change in replenishment amount and threshold;
- Denial of replenishment due to non-sufficient funds for a check;
- Credit card declined (a card on account no longer valid);
- Replenishment required (for manual replenishment accounts);
- Pending credit card expiration;
- Transponder return required;
- Negative account balance warning;
- Account suspension or revocation; and
- Account closure.

3.8.2.12 JPA and RCSC Customer Web Sites

The JPA Smart Lane website will provide general information about the project for general public access, including:

- Description of the project and how it operates;
- Contact information;
- Maps, location and opening hours of the BATA RCSC;
- Links to traffic condition and live web cams;
- Frequently Asked Questions (FAQs);
- General announcements;
- A web link that brings the person directly to the BATA home page; and
- Other to be determined links.

The BATA RCSC website will provide potential and existing customers with online capabilities for the following:

- Application for new account;
- Review of the previous statements;
- Account balance and transaction history;
- Account replenishment via credit or debit card;
- Customer information modification (address, telephone number, change of payment method, change account type, etc.);
- Credit card information modification (change of credit card details, etc.);
- Vehicle information modifications (add or remove vehicle from the account, etc.);
- Apply for additional transponders; and
- Report lost/stolen/found transponder.

Access to all account management functionality will require a secure log in, using the patron's account number and confidential password (or PIN). Access to this section of the website will require a secure connection to protect and encrypt data transmissions to and from the user's browser.

3.8.3 Interactive Voice Response (IVR) System

The BATA telephone system will have an IVR module that will be connected to the Customer Account Database (CAD). The IVR module will provide the Smart Lane customer with different options on a 24/7 basis, even when the RCSC is closed:

- Receive information on the RCSC location and opening hours;
- Open a new account;
- Order a new transponder for an existing account;
- Obtain the account status and balance; and
- Enter credit/debit card payment information.

3.8.4 Revenue Management

3.8.4.1 Automatic Smart Lane Trip Charges

Under normal operations, all of the Smart Lane trips, including transaction level detail, are automatically posted to the designated account after trip formation at the TPS. Transactions are sent electronically from the TZs to the TPS. The TPS combines transaction records to form trips and determine the appropriate toll charge, which will be inserted into the transaction that is sent to the BATA RCSC for account management purposes and as a basis for toll revenue receipt from BATA.

3.8.4.2 Payment Processing

The BATA RCSC payment processing includes:

- Account opening pre-paid tolls;
- Account opening transponder deposits;
- Account pre-paid toll replenishments;
  - Automatic with credit/debit card.
  - Manual accept cash, check, credit card or debit card.
- Monthly account maintenance fee;
- Monthly transponder fee (if applicable);
- Other specific fees (as detailed in the business rules);
- Account credits/debits;
  - Adjustments.
  - Refunds.
  - Non Sufficient Funds (NSF).
  - Write-off.

3.8.4.3 Credit Card Payments

The RSCS will manage the processing of credit card payments for account openings and replenishment (one-time or automatic) on a near real-time basis using a credit card clearinghouse. Reports are available for reconciliation of credit card activity from the RCSC as well as from the credit card clearinghouse. These reports are then reconciled with reports from the receiving bank. The reports are monitored for unusual activity such as excessive charges, credits or credit card discrepancies. Customers with pending expiration of credit cards are notified in the month prior to the expiration month.

3.8.4.4 Transponder Inventory

The RCSC will manage a detailed inventory of the Smart Lane transponders. The precise location (issued, lost, stolen, etc.), status and history of each transponder will be available at any time, and reports can be generated. The usual information maintained for each transponder includes:

- Current customer account assignment;
- Previous customer account assignments;
- External tracking number (serial number);
- Programmed type, facility code and tag ID;
- Manufacturer;
- Date received;
- Warranty expiration date;
- Status (e.g,. issued, in stock, lost, stolen, under repair, retired, etc); and
- Location (RCSC, customer issued, destroyed, etc.).

3.8.4.5 Transponder Status Update

The RCSC will allow transponder status to be updated based on a reported condition of issued, lost, stolen, defective, damaged, destroyed, returned, etc. Transponder status information is maintained and a full history of status changes is retained.

3.8.5 Account Management System Reporting

Reports will be created as needed based on priority and importance. A suite of Smart Lane use reports will be made available to JPA staff by setting up administrative level access to the accounts database by BATA management personnel. Each report will be based on the retrieval of information from the production server (or backup database). The following major grouping of reports will be available:

- Account Management;
- Revenue Management and Finance/Reconciliation;
- Transponder Inventory;
- Marketing;
- Traffic and Revenues; and
- System Administration and Maintenance.

3.8.6 Financial Controls and Processes

The RCSC will have audit capability and will generate an audit trail for every transaction either created by or received into the system. The software provides monitoring and diagnostics capability.

Every backend process produces progress statistics that are logged to the database, log files and/or the System Event Log. Alarms are triggered when processes do not complete as expected. These alarms can be configured as e-mail or pager notifications to responsible operations staff.

Revenue is tracked by payment method, including cash, check, credit card and debit card.

The payment methods apply to the following types (and sub-categories within these types):

- Website payments;
- IVR payments;
- RCSC payments received by mail, phone-in or at the walk-in RCSC; and
- Payments from a collection agency (depending on the business rules).

3.8.7 RCSC System Access

The RCSC will have integrated access control mechanisms. Access to the system is controlled via security mechanisms implemented through the application software using security groups (all users belonging to a security group will inherit the access privilege of that group). Each log-in ID is associated with a security group that has pre-specified and limited access to application components (read/write, access to certain data, etc.).

Additionally, user passwords are encrypted using a real-time encryption scheme. If a user forgets their password, the System Administrator can only reset the password to some new value. The system requires passwords to be changed periodically. Access to certain critical system functions may require more than one password and user ID or more complex security measures.

4. CONCEPT FOR MARKETING THE I-680 SMART LANE

4.1 INTRODUCTION

As opening day for the Smart Lane approaches, motorists will witness the unveiling of a new transportation infrastructure in the Bay Area, located in a travel lane that was previously reserved for carpools and transit vehicles only. The new HOV lane will be constructed to operate as a managed lane or HOT lane. For the first time, HOV users will be sharing the lane with SOVs. The new infrastructure will require that both groups adapt to new rules. Carpoolers will find increased traffic in "their" lane, but the lane will continue to operate at highway speeds since it will be regulated by the dynamic pricing system. However, the mixed-use lane users will experience less traffic in "their" lanes as SOVs switch to the Smart Lane. The uniqueness of this facility requires that the motoring public be educated as to how it will work and informed as to how to sign up for the ability to use it.

The Marketing Plan for the Smart Lane will define the unique experience of using the new service and include user perceptions about the ease of use, safety, reliability and customer service. The details of the marketing program will be provided in the Plan that will consist of an analysis of marketing conditions, definition of the market and audience, and a key issues outline. The Marketing Plan will also establish a mission and objectives for the marketing program and likely recommend an integrated campaign supported by media and advertising.

5. ANALYSIS OF THE I-680 SMART LANE SYSTEM

5.1 DISADVANTAGES AND LIMITATIONS

The collection of tolls from SOVs, while allowing HOVs, buses, motorcycles and other eligible vehicles to use the HOV lane free introduces several issues that must be resolved. One of the important issues to be addressed during the Project is the change in operations of the HOV lane upon the implementation of Smart Lane operations. Under the Smart Lane operation, limited access will be available to those vehicles that are allowed to utilize the HOV/Smart Lane, which is a change from the current HOV lane continuous access that is allowed.

5.1.1 Transponder Reads in Non-HOV Lanes

Vehicles traveling in the mixed-use lanes that are carrying transponders might have them read by the TZ detection equipment. This could result in user dissatisfaction and a loss of confidence in the ETS. The Smart Lane system will utilize technology that will greatly reduce the occurrence of cross-lane reads. This is not expected to be a significant issue since not all vehicles traveling in the mixed-use lanes will have a transponder.

The JPA should develop business rules to address complaints resulting from cross-lane reads. It is recommended that the activity for the transponder in question on the day in question be examined for other reads. If there is no activity indicating a trip was made that day, the transaction should be adjusted to a zero toll.

5.1.2 HOV Lane Congested

There will be occurrences when a traffic incident in or near the HOV/Smart Lane will cause traffic to slow significantly or stop. Since the ETS might not be able to adjust rapidly enough to prevent users from entering the Smart Lane during the incident, complaints may surface because the customer paid for a free-flow trip and it was not delivered. It is recommended that the JPA reverse the toll fee for those trips when a customer files a legitimate complaint.

5.1.3 HOV with Transponders

Smart Lane customers who normally drive alone may occasionally use the HOV lane with two or more people in the vehicle. In such instances, they will be instructed to remove the transponder and place it in their anti-static bag to prevent it from being read. However, failure to do so could result in a tag read and toll charge, which would make that customer dissatisfied when they receive their statement and see the erroneous toll charge. It is recommended that the JPA institute a business rule that allows one toll transaction to be removed from a customer's account for a given time period (one per quarter, one per year, etc.).

5.1.4 Lost, Stolen and Invalid Transponders

The Smart Lane ETS will not utilize typical video enforcement. As a result, preventing the use of lost, stolen or invalid transponders will be difficult. Enforcement of the continued use of these transponders will have to be done by CHP officers checking for these units at times of known use.

5.1.5 Enforcement

The inability to accurately report the mix of SOVs, HOVs and violators creates an environment where the impact of enforcement cannot be definitively measured. Too much enforcement may cause congestion in the HOV lane, and too little may result in customer dissatisfaction and lack of confidence in the ETS. It is recommended that periodic studies be conducted to determine the violation rate and adjust the enforcement intensity to reflect the findings of those studies.

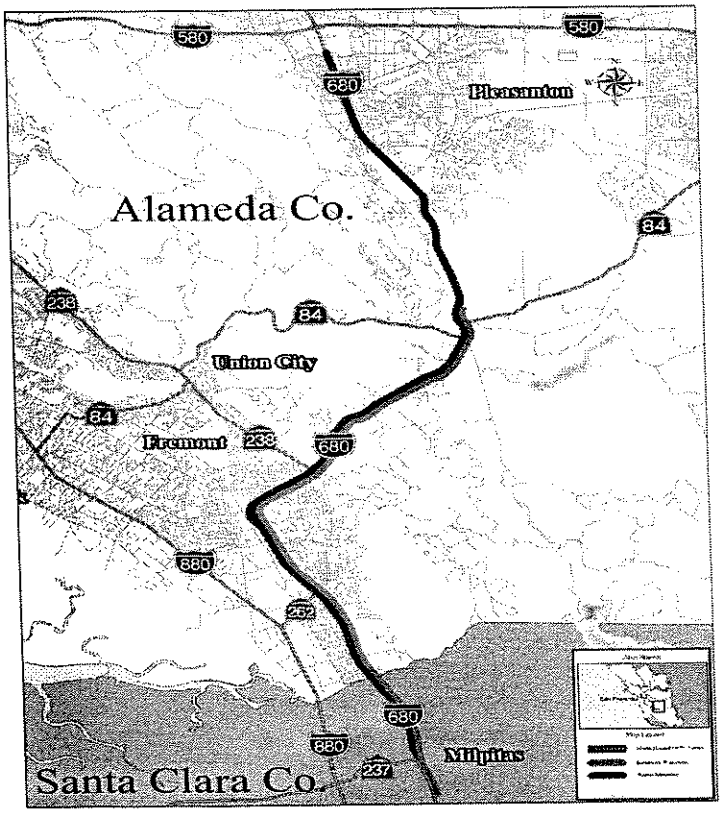
EA: 253751

August 25, 2005

Fact Sheet for
Route 680 *Southbound* Widening Final Phase
Including Auxiliary Lanes and Ramp Metering

September 1, 2005
Agenda Item 6.0
Attachment 1

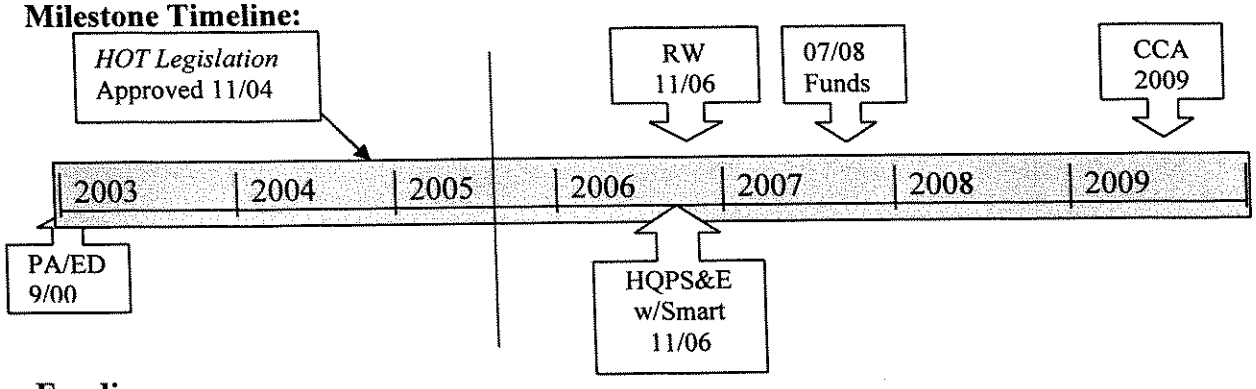
Location Map:



Project Description:
Final phase of Southbound I-680 HOV Lane Project. Widen freeway and structures to meet current standards, install ramp metering facilities and construct auxiliary lanes between Washington Blvd. and Jacklin Road. Project limits are from Stoneridge Drive in Alameda County to Route 237 in Santa Clara County.

It is proposed to incorporate elements (signing, striping, and electrical equipment) of the Smart HOV/HOT lane pilot project into this contract. In addition, the JPA will administer an ETS implementation contract to install the final electronic components needed to open the Smart lane. This will be timed concurrently with the State contract to allow for opening the Smart lane.

Milestone Timeline:



Funding:
CTC designated corridor project. Funding includes ITIP, Alameda & Santa Clara RIP, Measure, Local, and TEA-21. Funding availability will impact schedule.

Coordination:
State is the design lead with structure design being accomplished through the ACCMA. State will administer the construction contract. Smart lane design will be a coordinated effort.

Alameda County Congestion Management Agency

I-680 Soundwall Project
Construction Contract Progress Report

Period Ending July 31, 2005

Percent Complete: 83%
Estimated Date of Completion: September 30, 2005

Project Description

This project consists of constructing soundwalls 10-foot to 16-foot in height along the I-680 corridor within Fremont and Milpitas city limits. This project is one of the components of the overall I-680 Corridor Improvements. This project includes the construction of twelve (12) segments of soundwalls within this vicinity. The soundwalls are constructed of masonry blocks placed on top of either pile caps or retaining wall supported by spread footings. This is a $11.5 million project.

Summary Status

The contract was started on April 28, 2004. The contractor has completed a majority of the walls that are included in this contract. The contract was initially scheduled to be completed in mid April 2005. The inclement weather this winter resulted in 53 non-work days. An additional 42 days have been added to the contract by change order, including the addition of a new wall segment in Milpitas in the vicinity of wall SB-2. The addition of the new wall segment in Milpitas added 24 (working) days, or about five weeks, of work.

Construction Status

Listed in the following table is the status of each soundwall segment, progress in the last month, and planned activities in the month following.

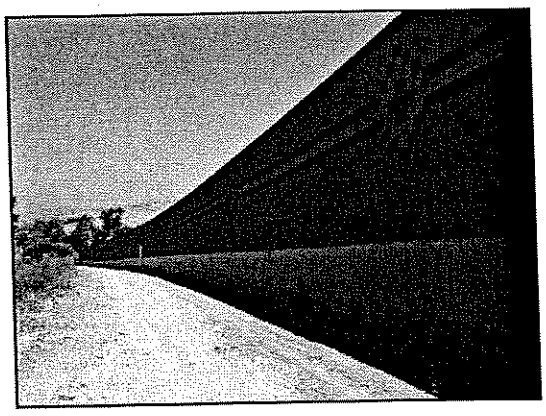
Location/Progress Last Month	Planned Activities Next Month
General:	
1. Maintain Summer Storm Water Pollution Prevenion Plan (SWPPP) protection measures around the jobsite, including construction entrances and concrete washouts.	1. Maintain SWPPP measures.
Soundwall SB-1 (Milpitas):	
1. Most of the masonry block is completed.	1. Currently grading the front of the wall. The side fences have been installed and the temporary fences in the residents back yards have been removed. There is still some clean up of debris in the Temporary Construction Easement (TCE) area.

Soundwall SB-2 A & B (Milpitas):	
1. SB-2A: Block is complete.	1. SB-2A: Punch-listing the wall and moving k-rail later this month.
2. SB-2B: Wall is complete except for the installation of the access doors.	2. SB-2B: Final punch-list items need to be completed before final acceptance of this wall.
Soundwall SB-2 B Extension:	
1. Block has been completed on this wall.	1. Final grading in front of the wall and connecting side fences will be completed later this month.
Soundwall SB-3 (Fremont):	
1. Drainage systems and the retaining wall are complete.	1. Form/Pour barrier rail and get ready for masonry block.
Soundwall SB-4 (Fremont):	
1. SB-4A: Barrier has been installed.	1. SB-4A: Start placing masonry block in early August.
2. SB-4B: Retaining wall at 4B has been backfilled.	2. SB-4B: After some minor grading, the area will be ready for masonry block.
Soundwall SB-5 (Fremont):	
1. Masonry block is complete and resident fences have been connected to the new soundwall.	1. Back yards are done and the front of the wall has been graded and hydroseeded. Only item left is to install the Right-of-way fence at the ends of the new soundwall and minor touch-up of city curbs next to the wall.
Soundwall NB-8 A & B (Fremont):	
1. NB-8A: The forming and pouring of the retaining wall, backfilling and the construction of the concrete barrier have now been completed.	1. NB-8A: Ready for masonry block and electroliers.
2. NB-8B: The retaining wall along the last three homes has been backfilled and the barrier has just been poured. Have also started to install the PCC gutter along most of the wall on the freeway side. Resident side-fences have also been installed.	2. NB-8B: Place masonry block for the last three homes in about three weeks. Will also work on clean-up back of wall and prepare for connect of resident fences to the new soundwall. This should happen within the next two weeks. Also, need to do some clean-up work along some homes where the old TCE used to be before approving the wall.
Soundwall NB-14 A & B (Fremont):	
1. NB-14A: Bottom 7 courses of the wall have been done and the backfilling on the resident's-side of the wall is complete.	1. NB-14A: Started masonry block again this past week and will have all the block done in early August.
2. NB-14B: Backfilling retaining wall at NB-14B is complete and concrete barrier on the retaining wall is almost complete as well. The grade beam over the Hetch-Hetchy lines is complete.	2. NB-14B: Started placing masonry block again and will have the block done in early August

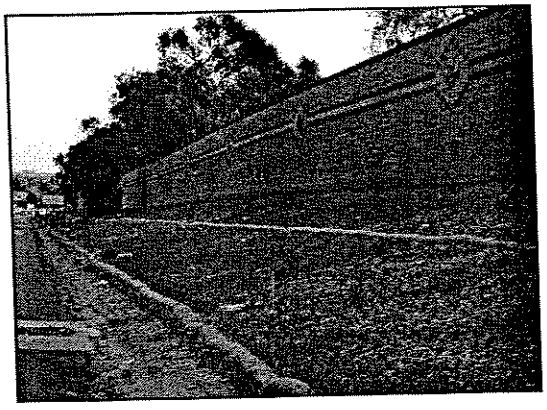
PROJECT PHOTOS

Soundwall SB-1 (block complete)

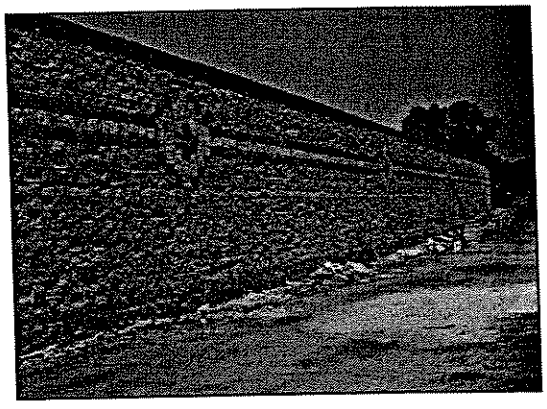
Soundwall SB-2A (block complete)



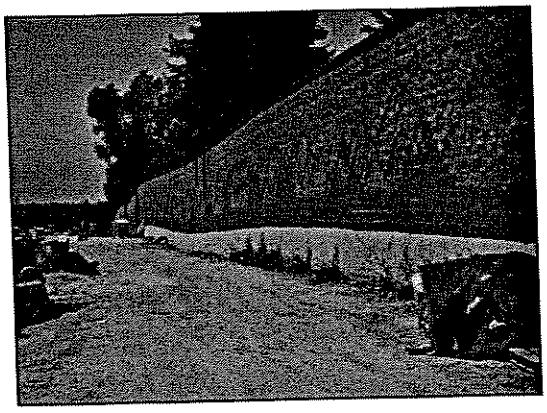
Soundwall SB-2B (complete)



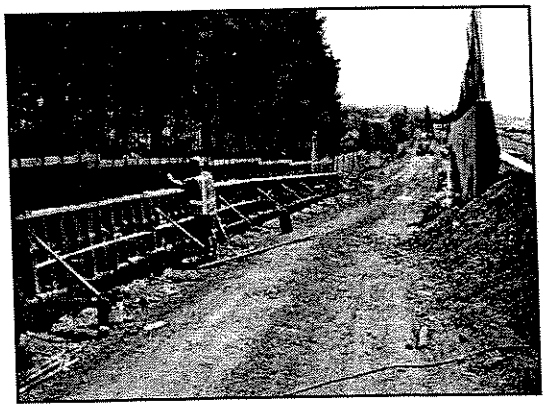
Soundwall SB-2B Extension (block complete)



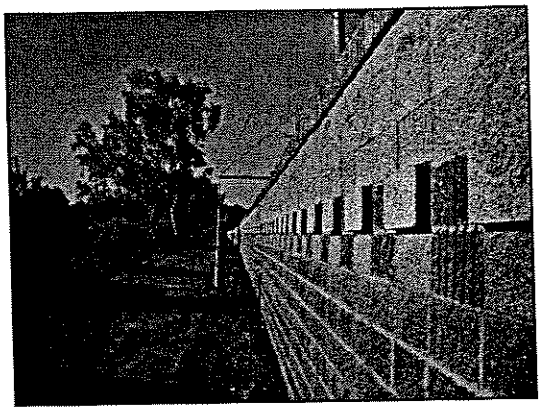
Soundwall NB-8B (in progress)



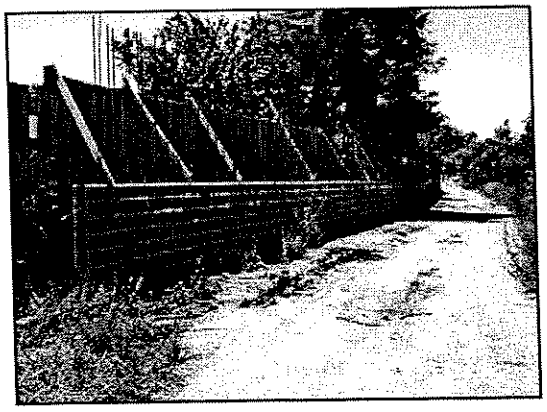
Soundwall NB-8B (in progress)



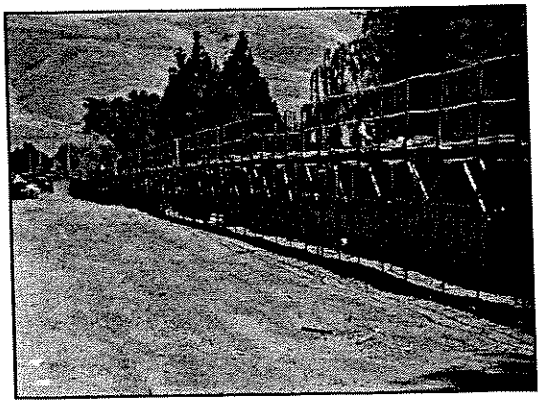
Soundwall SB-5 (complete)



Soundwall SB-14A (in progress)



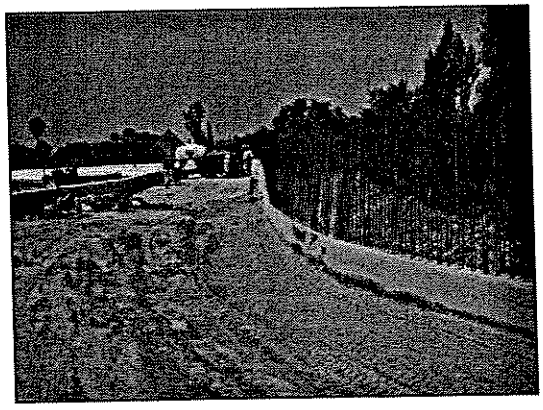
Soundwall SB-14B (in progress)



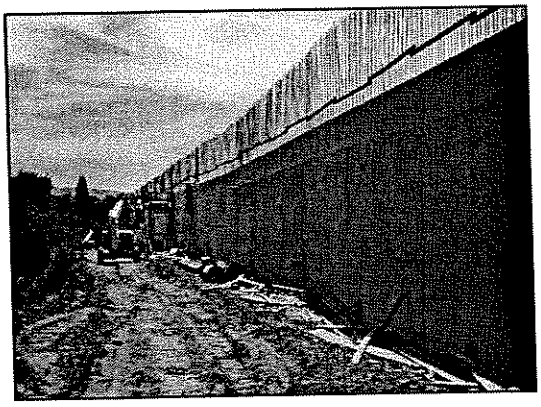
Retaining Walls

The contractor has completed the retaining wall system located along NB-14B and has completed the drainage on the freeway-side of the wall. The area is now ready for masonry block.

Soundwall SB-4A (getting ready for block)



Soundwall NB-8A (getting ready for block)



I-680 Soundwall Project

Soundwall Locations for Construction Package – September 2002